STUDENT HANDOUT

PREFACE

Unexploded ordnance (UXO) on the battlefield affects the mobility and mission aspects of all units. Battlefields are littered with UXO hazards from two sources: ordnance that has either failed to function or ordnance designed to be used for area denial, such as conventional land mines and the family of scatterable mines (FASCAM). With the sophistication of modern weapons systems, battlefield commanders can target anything within their theater of operations. After these attacks are completed, UXO hazards will probably be left on the battlefield.

UXO hazards may not always pose an immediate threat to unit mission or mobility, but they are hazards that have in the past caused needless loss of life and materiel. Battlefield commanders need to know where UXO hazards are, as these hazards can affect the mobility of follow-on elements. This manual teaches personnel about the UXO hazard and how this hazard affects mission capabilities and what procedures are used to report and protect personnel and equipment. All units should be able to react to the UXO hazard effectively and to report and protect against it.

During mission planning, leaders must coordinate with supporting artillery and supporting air liaison personnel to find out what areas are expected to contain large numbers of UXO. These areas should be avoided if possible. This type of planning makes a unit more mission capable.

There are two types of UXO threats on the battlefield: passive (UXO that is found during unit movement) and active (UXO that results from an attack). All units must be able to react to both of these types of threats in order to survive on the modern battlefield. Chapter 5 of FM 21-16 covers the procedures for reacting to these threats. Additional information may also be found in FM 20-32, Chapter 11.

All military personnel and certain DOD civilians and contractors risk injury or death from UXO. Therefore, all of these personnel need to understand how to identify, report, mark and, if necessary, apply protective measures against UXO. This handout was designed to be used by all of these personnel. All users of this handout are referred to as personnel in the text.

THE UXO HAZARD

There were 21 US Army personnel killed and 53 injured during Operation Desert Storm as a direct result of handling UXO. Every person on the battlefield must be able to recognize and react to these hazards. Likewise, every leader must ensure that all personnel know how to recognize and react to these hazards**.**

UXO LOCATIONS AND THREATS

UXO are hazards—whether on the battlefield or in designated impact areas. UXO includes ordnance items that have been fired, projected, dropped, or placed in such a way that they could become armed and go off. Whether in an area by design or accident, these items have not yet functioned. Whatever the reason, UXO poses the risk of injury or death to all personnel.

The EOD mission is to eliminate or reduce the threat of UXO hazards. The engineer mission is to clear minefields and wide areas of area-denial submunitions. However, these two groups individually or together will be unable to react immediately to an enemy submunitions or scatterable-mine attack on a position. Any unit that cannot extract itself from these attacks risks being fixed in place and destroyed by follow-on enemy fire. In wartime there are two types of UXO threats, passive and active. The passive threat refers to any ordnance found by personnel as they move across the battlefield. The active threat refers to any ordnance that remains in the area after a direct attack on a position. All units must be able to react to both types of UXO threats in order to survive on the battlefield.

In addition to the battlefield, UXOs are also found in designated impact areas. These areas are marked on all military maps, and they are also marked on the ground by warning signs and fences. Personnel are not allowed in these areas because of the UXO hazards.

GENERAL SAFETY GUIDELINES

Personnel can lessen the danger of UXO hazards by being able to recognize a UXO hazard and by strictly following the basic safety guidelines listed below.

- Do not continue to move towards a suspected UXO. See Figure 1. Some types of ordnance have magnetic or motion sensitive fuzing and will not detonate until they sense a target. Others may have self-destruct timers built in. Once you recognize a UXO hazard, **do not** move any closer. Make any further observations with binoculars if necessary.

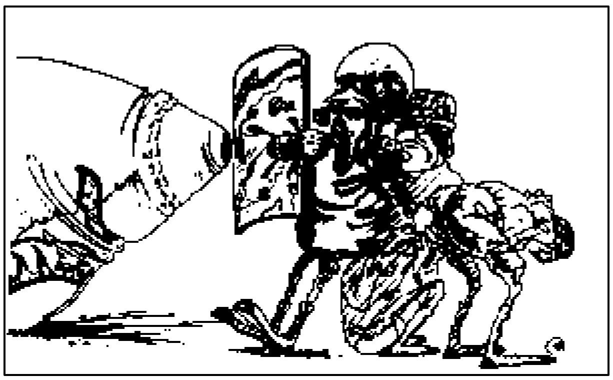


Figure 1. Never approach a suspected UXO.

Figure 2. Never transmit near a UXO.

- Make all radio transmissions at least 100 meters away from a UXO hazard. See Figure 2. When transmitting, radios send out electricity from their antennas. This electricity can make a UXO blow up.

- Do not try to remove anything that is on or near a UXO. See Figure 3. Your actions could make the UXO blow up.

Figure 3. Never attempt to remove any part of a UXO.

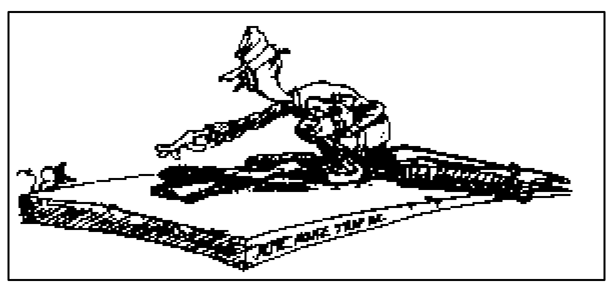


Figure 4. Never attempt to disturb a UXO.

- Do not move or disturb a UXO. See Figure 4. It could blow up.

- Stay away from UXOs. See Figure 5. This is the best way to prevent accidental injury or death.

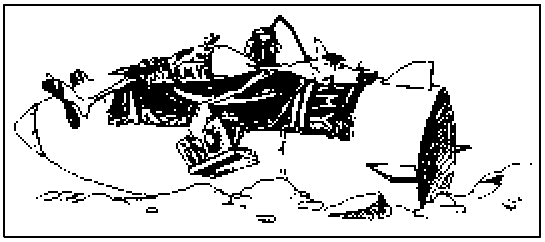


Figure 5. Avoid the area where a UXO is located.

- Mark a UXO hazard area properly so that other people will stay away from it. See Figure 6. Proper marking also helps EOD technicians find the area when they respond to your report.

Figure 6. The area must be clearly marked.

- Evacuate all nonessential personnel and equipment from a UXO hazard area. If personnel and equipment cannot be evacuated, you must take protective measures to reduce the risk to them.

- Report through your chain of command all UXO hazards that affect your operations. Reporting UXO hazards will get your unit the help it needs.

- If necessary, extract the unit from a hazardous area. Chapter 5, FM 21-16 provides detailed unit extraction techniques. Unit's that cannot self-extract will more than likely be destroyed in place by the enemy.

RECOGNIZE UXO

Being able to recognize a UXO is the first and most important step in reacting to a UXO hazard. There is a multitude of ordnance used throughout the world, and it comes in all shapes and sizes. This section of the handout explains and shows the general identifying features of the different type of ordnance, both foreign and U.S. In this handout, ordnance is divided into four main types: dropped, projected, thrown, and placed. While personnel are not expected to determine ordnance fillers, the color codes on the ordnance (Soviet-style and U.S) help to identify the types of UXO.

1. **Type: Dropped Ordnance.** Regardless of its type or purpose, dropped ordnance is dispensed or dropped from an aircraft. Dropped ordnance is divided into three subgroups: bombs, dispensers, which contain submunitions; and submunitions.

DANGER

All bombs and submuntions should be considered to have magnetic/seismic or antidisturbance fuzing. Your approach could detonate them. All observation should be done with binoculars from the greatest distance possible that still allows the gathering of necessary information.

a. Subgroup bombs.

(1) The general-purpose (GP) bombs of all countries are similar in construction to the one shown in figures 7 through 9. About 50 percent of the weight of most bombs is explosive filler. All unexploded GP bombs, whether buried or unburied, must be considered as having a delay or antidisturbance fuze. Observe all safety precautions, such as evacuating personnel, closing off areas, and preventing unnecessary vibrations near the unexploded bomb. The soldier must not attempt to uncover the bomb under any conditions.

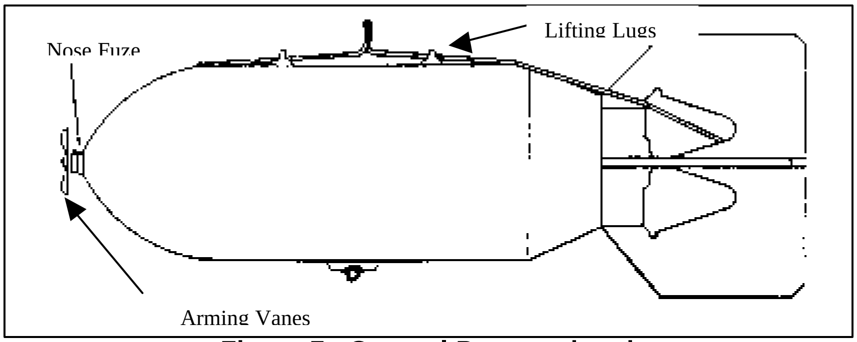


Figure 7. General Purpose bomb.

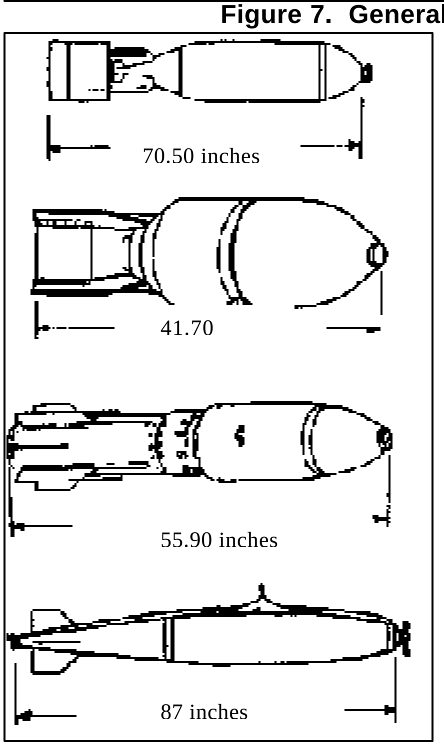


Figure 8. U.S. GP Bombs.

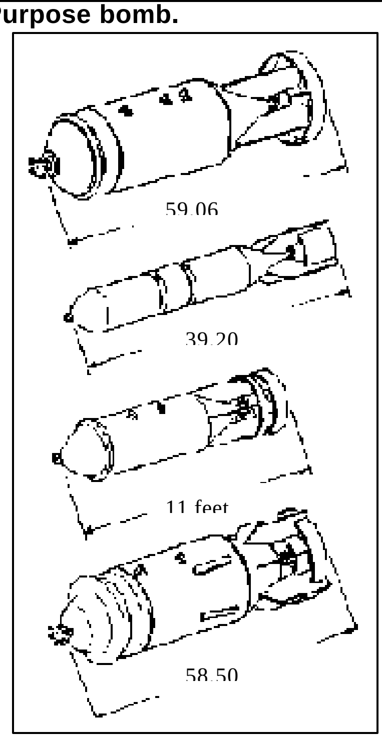


Figure 9. Soviet-style GP bombs.

(a) The bomb body is a metal container that holds an explosive filler, or a nuclear warhead. It may consist of a single piece of metal or several pieces welded or otherwise joined together.

(b) Bombs are stabilized in flight by either fin or parachute assemblies. These assemblies attach to the rear of the bomb and keep the bomb nose-down during its descent. These assemblies can separate after the bomb hits the ground. The three types of fin assembly commonly used with bombs are box, conical or streamlined, and retarding. The box type, shown in figure 10 consists of a fin sleeve, which fits over the bomb tail, and sheet metal blades that are joined to the fin sleeve or to each other to form a box-like assembly. See figure 11 for old-series conical or streamlined fins. Figure 12 depicts two common types of fin assemblies used by foreign counties. The retarding fin assembly shown in figure 13 is used by the U.S. for most of its general-purpose bombs. Some bombs are stabilized by a parachute assembly as shown in figure 14. The parachute assembly open after the bomb is released from the aircraft. Even though the parachute may separate from the bomb after it hits the ground, you should never try to recover a parachute assembly found lying on the ground. The bomb may have become buried, and the parachute could still be attached to the bomb. Former Soviet Union bombs have fins that are welded to the bomb body (see Figure 15.) Therefore, the fins cannot become separated from the bomb. However the fins can wrap around the rear section of the bomb after it hits the ground and obscure the tail fuze from view.

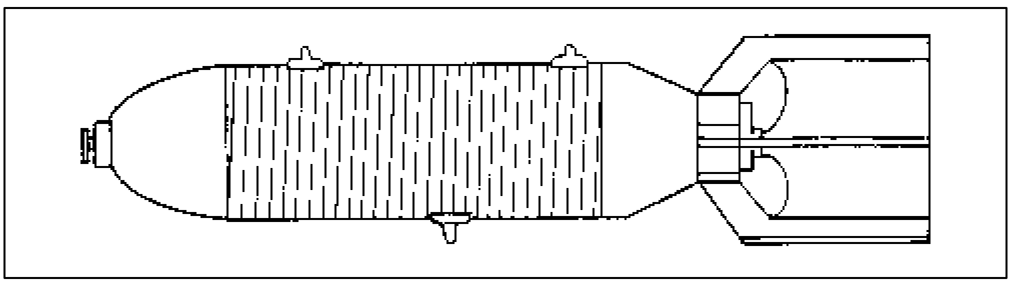


Figure 10. Fragmentation (frag) bomb with box fins.

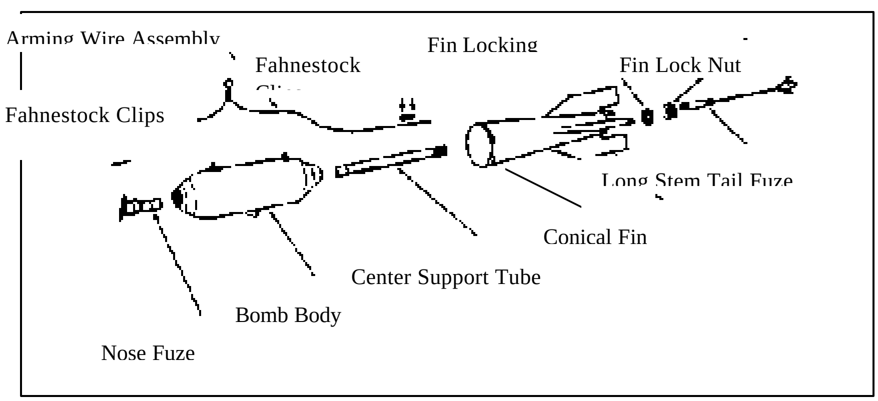


Figure 11. Old-series GP bomb with conical fins.

(c) Fuzes are mechanical, electrical, or chemical devices used to initiate bombs when desired (see Figure 16). They are generally placed in the nose or tail section, internally or externally. The fuzes may not always be visible, as they are often covered by the fin assembly. As shipped, fuzes are in a safe (unarmed) condition and cannot function until armed.

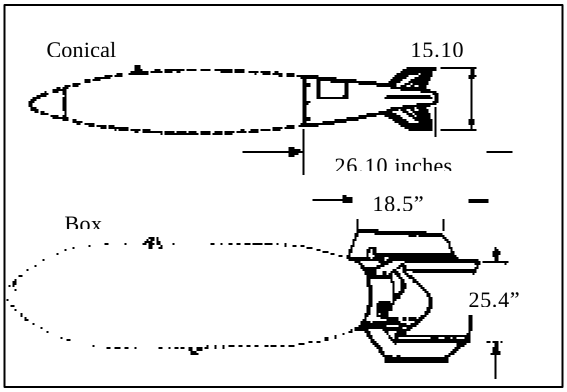


Figure 12. Foreign conical and box-fin assemblies.

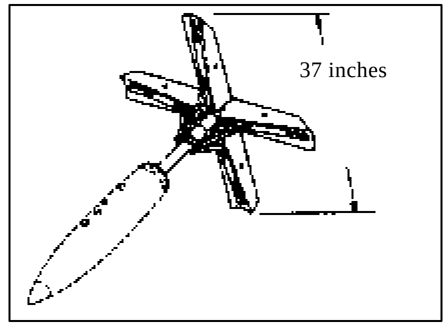


Figure 13. Retarding-fin assembly.

(d) An arming vane assembly is a small impeller device with sheet metal blades attached to a mechanical fuze. Arming vanes differ in pitch, shape, and length of blade.

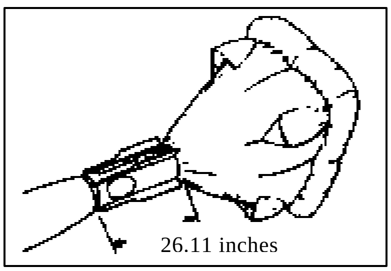


Figure 14. Parachute assembly.

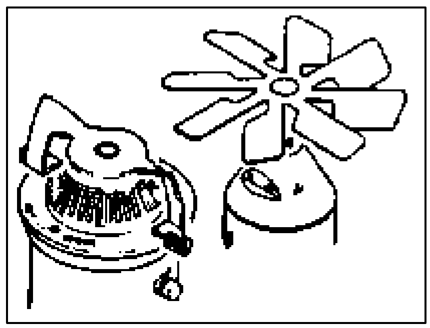


Figure 16. Bomb fuzes with arming vanes.

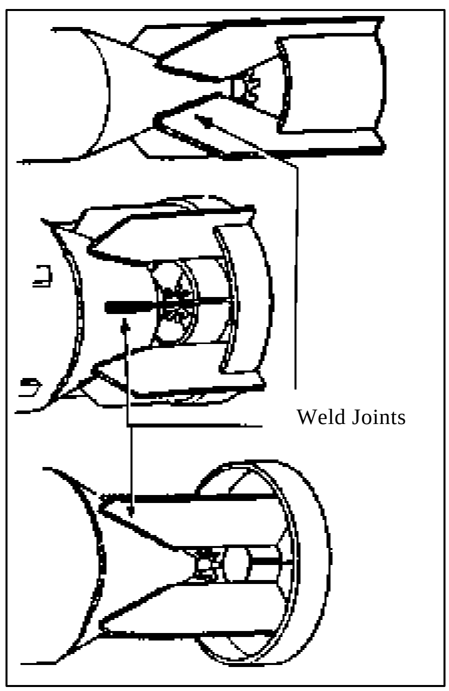


Figure 15. Soviet-style fin assemblies.

(2) Some demolition bombs (demo) and all light case (LC) bombs carry a heavy explosive charge to produce the maximum blast effect. The explosive charge is usually 70 percent or more of the

total weight. A typical LC demo bomb is shown in Figure 17. The same safety precautions that apply to GP bombs also apply to LC and demo bombs. The blast effect caused by demo and LC bombs is much greater than that caused by GP bombs. Explosives exposed by a broken case present an additional hazard to the soldier.

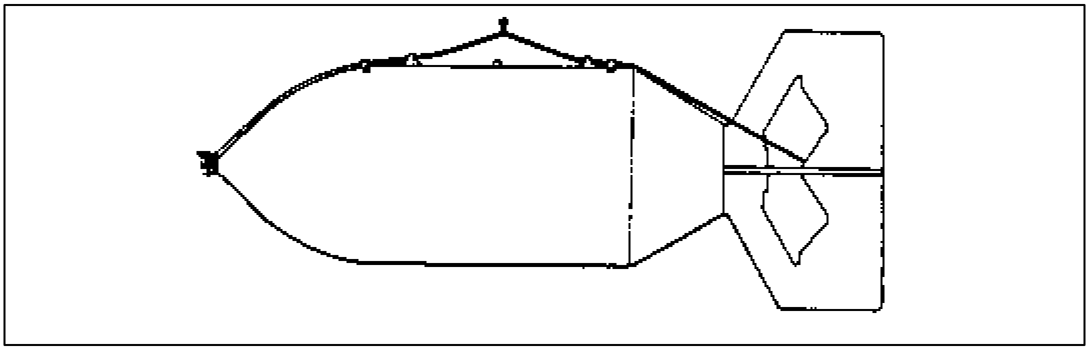


Figure 17. U.S. light case demolition bomb, 4,000-lb.

(3) Rocket-assisted armor-piercing bombs use a rocket motor for deep penetration of bunkers, runways and other installations. The U.S. has never made a bomb of this type; however, seven foreign countries have used them. The former Soviet republics have several bombs of this type, one of which is shown in Figure 18.

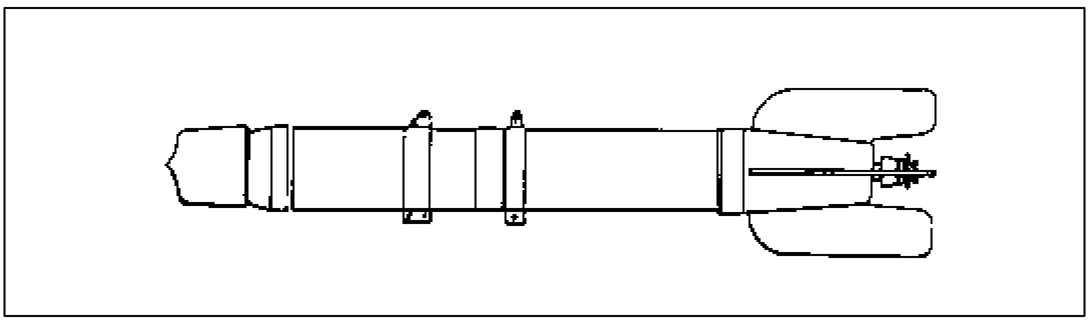


Figure 18. Former Soviet republic rocket-assisted armor piercing bomb.

(4) Frag bombs are used against personnel and against light and heavy materiel. These bombs project high-speed fragments of a square steel bar that was wrapped in a spiral to form the bomb body, as shown in Figure 19.

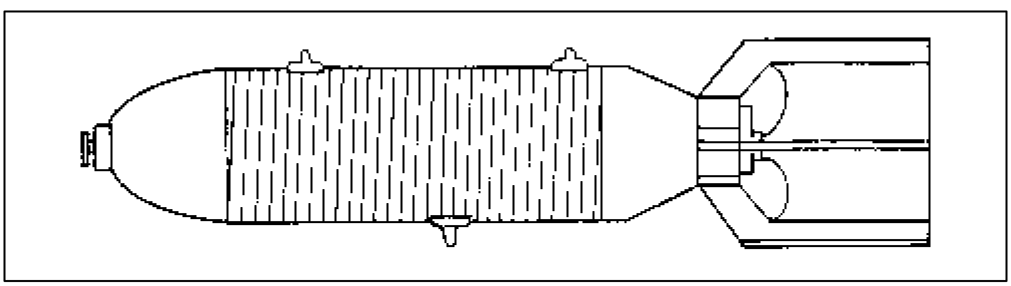


Figure 19. Frag bomb.

DANGER

All soviet bombs, regardless of type, should be suspected of containing a toxic agent as a backup.

(5) Chemical (gas) bombs usually resemble GP or LC bombs in external appearance, as shown in Figure 20. They may or may not have visible filler plugs, and the fuzing may be airburst or impact. This is why the color coding is very important and must be included in the unexploded ordnance (UXO) incident report. For example, the U.S./NATO color code for toxic chemical munitions is gray with green markings and a yellow band if the bomb has an explosive burster. The former Soviet republic forces use a dark gray background on all bombs, with a combination of green, yellow, red, and blue to indicate chemical agents. The soldier must never approach a suspected gas bomb. Stay upwind from the munition and use binoculars for identification, because it may be ruptured and leaking toxic agent.

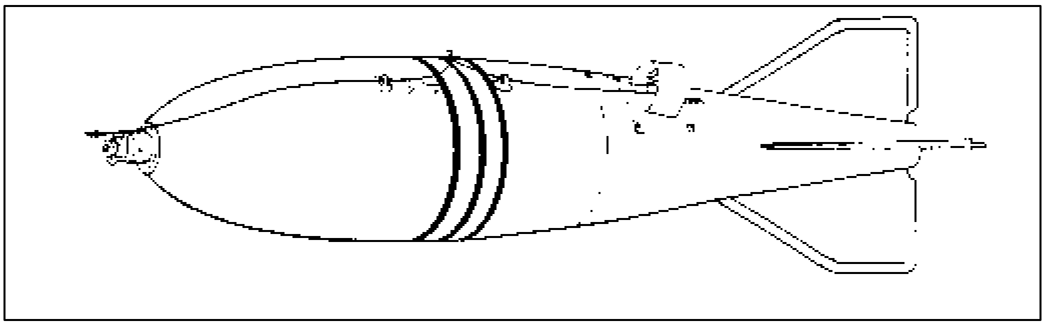


Figure 20. U.S. chemical (gas) bomb, 750-lb. MC1 GB.

(6) Fire bombs consist of thin-skinned containers filled with thickened fuel. They are used against such targets as dug-in troops, supply installations, wooden structures, and convoys. They are also used as a defoliant. Most fire bombs, including the one shown in Figure 21, are not stabilized.

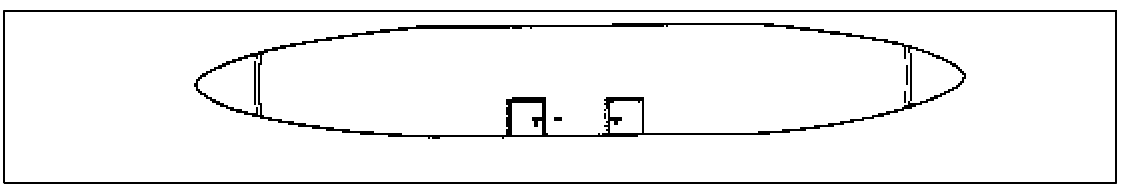


Figure 21. U.S. BLU-1/B fire bomb.

(7) Except when fuzed for airburst, they rupture on impact and spread burning fuel on surrounding objects. Fuze igniter combinations are used to ignite the combustible filling. Fire bombs contain two fuze igniters like the one shown in Figure 22. These are very sensitive to movement.

(8) Incendiary bombs are filled with burning agents, such as thickened fuels and metallic fillings. A third type of incendiary material, not classified as a filling, is the magnesium used in the bodies of some incendiary bombs, such as the one shown in Figure 23.

(a) Thickened fuels are flammable liquids, such as gasoline, thickened to a jelly.

(b) The basic ingredient of metallic incendiary fillings is a mixture of powdered aluminum and powdered iron oxide called thermite (TH1). When ignited, TH1 burns at a temperature of about 4,000 degrees Fahrenheit.

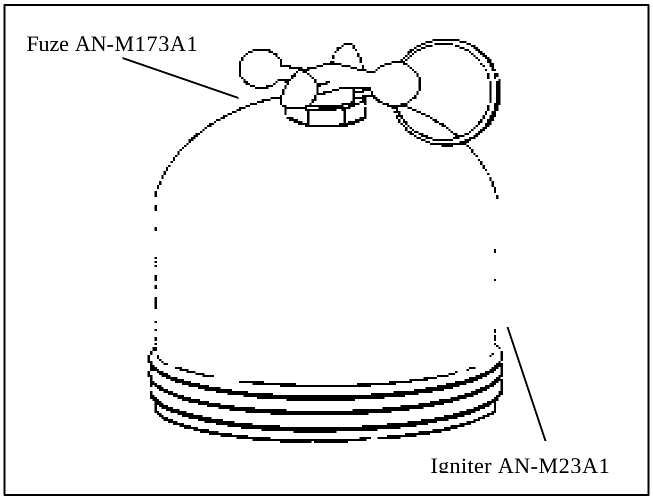


Figure 22. Igniter AN/M23A1

(c) Magnesium. Magnesium is a soft metal that ignites and burns rapidly when heated in the presence of air.

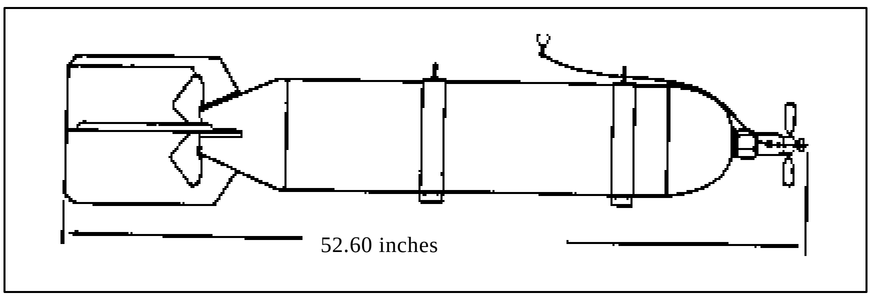


Figure 23. U.S. Incendiary bomb.

(d) Small incendiary bombs, such as the one shown in Figure 24, are usually contained in large cluster bombs. They are scattered over a large area and are normally impact-fuzed.

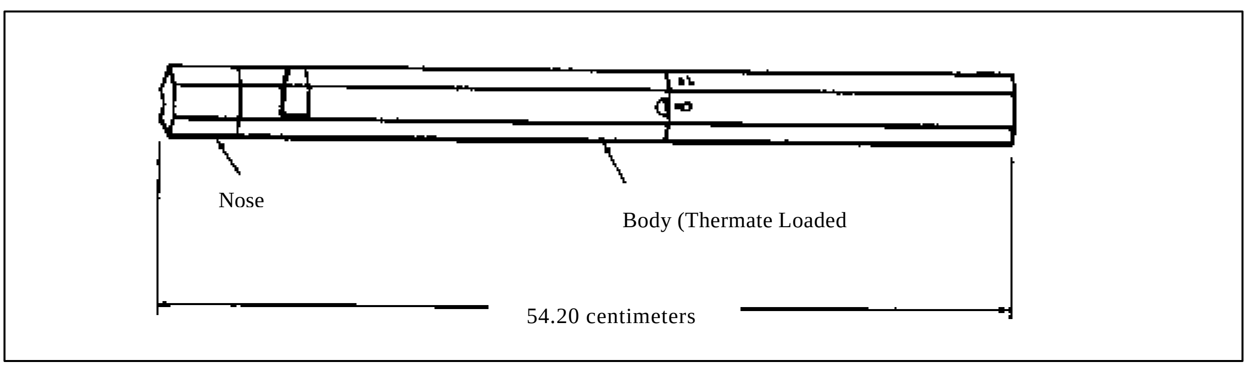


Figure 24. U.S. Incendiary bomb (impact-fuzed)

(e) Some small incendiary bombs have an explosive charge that explodes after a delay to deter fire fighters. The soldier must consider all small incendiaries to contain explosive devices like the one shown in Figure 25.

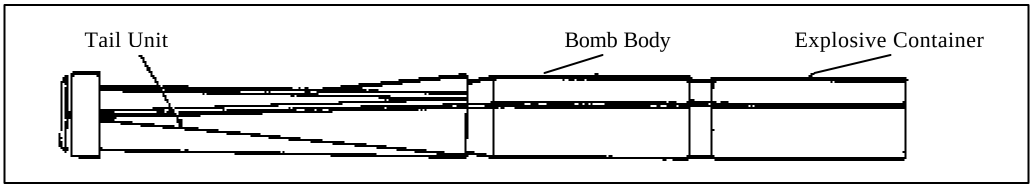


Figure 25. High-explosive incendiary bomb.

(9) Smoke bombs are used to conceal combat areas and troops and ship movements. They are also used for target marking and for antipersonnel (APERS) effect. A smoke bomb is shown in Figure 26.

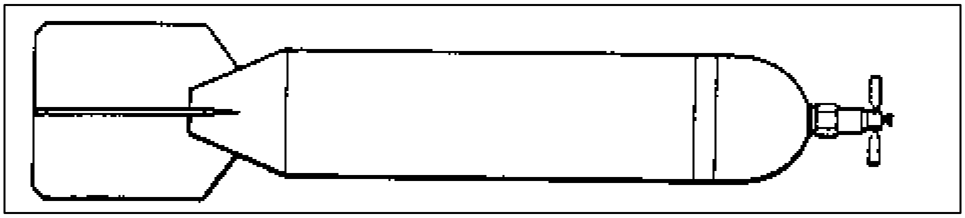


Figure 26. U.S. White Phosphorous (WP) or PWP smoke bomb.

b. Subgroup Dispensers.

(1) Dispensers may be classified as another type of dropped ordnance. Like bombs, they are carried by aircraft. Their payload, however, is smaller ordnance called submunitions. In Figure 27, the cutaway shows the submuntions inside the dispenser body. Dispensers come in a variety of shapes and sizes depending on the payload inside. Some dispensers are reusable, and some are one-time-use items.

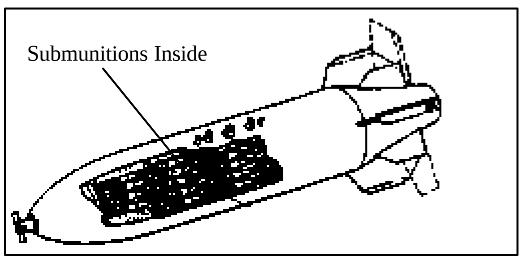


Figure 27. Dispenser (cutaway section).

(2) Never approach a dispenser or any part of a dispenser you find on the battlefield. The payload of submunitions always scatters in the area where the dispenser hit the ground.

(3) Dropped dispensers. These dispensers (Figure 28) fall away from the aircraft and are stabilized in flight by fin assemblies. Dropped dispensers may be in one piece or in multiple pieces. All dropped dispensers use either mechanical time or proximity fuzing. These fuzes allow the payload to be dispersed at a predetermined height above the target.. Multiple-piece dispensers open up and disperse their payload when the fuze functions. Single-piece dispensers eject their payload out of ports or holes in the body when the fuze functions.

(4) Attached dispensers. These dispensers stay attached to the aircraft and can be reloaded and used again. Their payload is dispersed out the rear or from the bottom of the dispenser. See Figure 29.

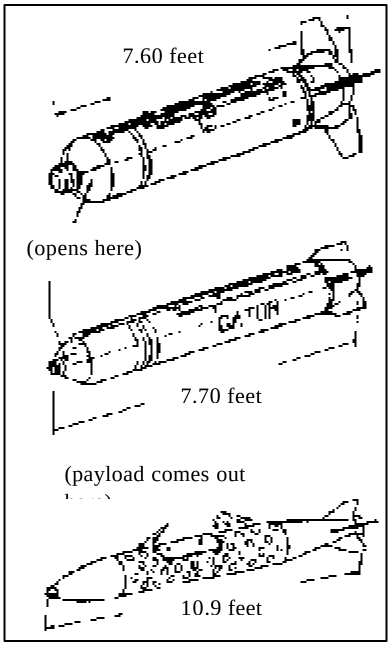


Figure 28. Dropped Dispensers.

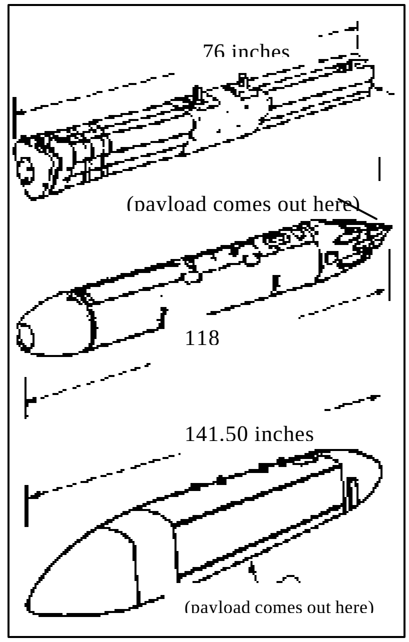


Figure 29. Attached dispensers.

c. Subgroup submunitions.

(1) Submunitions are classified as either bomblets, grenades, or mines. They are small explosive-filled or chemical-filled items designed for saturation coverage of a large area. They may be antipersonnel, antimaterial (AMAT), dual-purpose (DP), incendiary, or chemical. Submunitions may be spread by dispensers, missiles, rockets, or projectiles. Each of these delivery systems disperses its payload of submuntions while still in flight, and the submunitions drop over the target. On the battlefield, submunitions are widely used in both offensive and defensive missions. The APERS submunition shown in Figure 30 can be spread by aircraft or artillery shells. When it hits the ground, a small fragmentation ball shoots up and detonates about 6 feet above the ground.

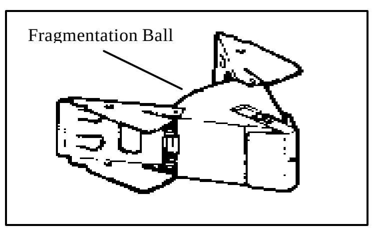


Figure 30. APERS bounding-fragmentation submunition.

(2) Submunitions are used to destroy an enemy in place (impact) or to slow or prevent enemy movement away from or through an area (area denial). Impact submuntions go off when they hit the ground. Area-denial submunitions, including the family of scatterable mines (FASCAM), have a limited active life and self-destruct after their active life has expired. The FASCAMs shown in Figure 31are delivered into areas for use as mines. When they hit the ground, trip wires kick out up to 20 feet from the mine. All area-denial submunitions use antidisturbance fuzing as a backup. The self-destruct time can vary from a couple of hours to as long as several days.

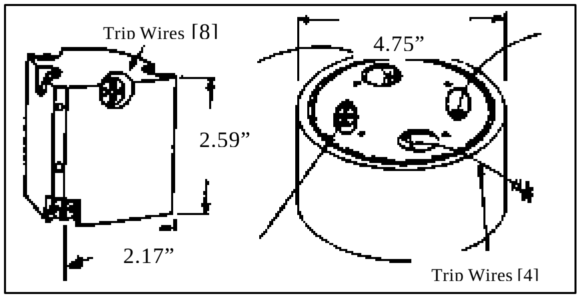


Figure 31. APERS area-denial submunitions (FASCAM).

(3) The major difference between scatterable mines and placed mines is that the scatterable mines land on the surface and can be seen. Placed mines, discussed in a later section may be hidden or buried under the ground and usually cannot be seen.

(4) The ball-type submunitions shown in Figure 32 are APERS. They are very small and are delivered on known concentrations of enemy personnel. APERS submunitions have small fragments that are designed to inflict casualties. They range from 2 to 4 inches and are spherical munitions. The submunition shown in Figure 33 is scattered across an area. Like a land mine, it will not blow up until pressure is put on it.

DANGER

These submunitions may have antidisturbance devices.

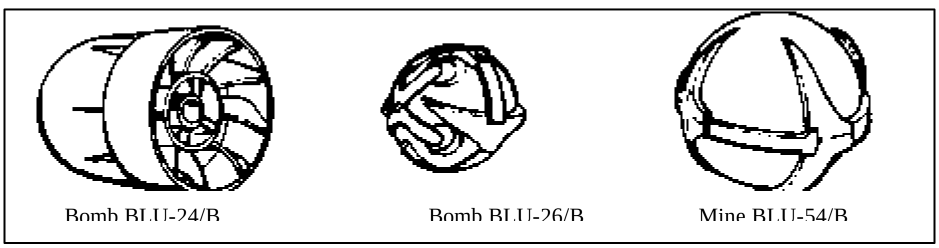


Figure 32. APERS bomblets.

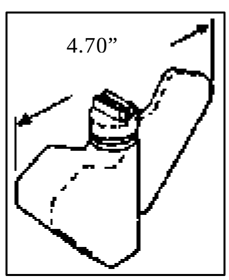


Figure 33. APERS pressure-activated submunition.

(5) The DP submunition in Figure 34 has a shaped charge for penetrating hard targets but is also used against personnel. These submunitions are delivered by artillery or rockets. The arming ribbon serves two purposes: it not only arms the fuze as the submunition comes down, but it also stabilizes the submunition so that it hits the target straight on.

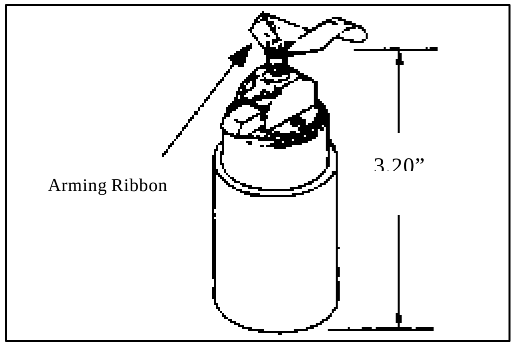


Figure 34. DP submuntion.

(6) The AMAT and/or AT submuntions shown in figure 35 are designed to destroy hard targets such as vehicles and equipment. They are dispersed from an aircraft-dropped dispenser and function when they hit a target or the ground. Drogue parachutes stabilize these submunitions in flight so that they hit their targets straight on. The submunitions shown in figure 36 are also used to destroy hard targets such as vehicles and equipment. The only difference is that the fin assembly stabilizes the submunition instead of the drogue parachute.

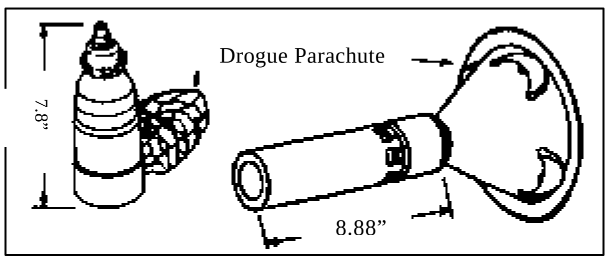
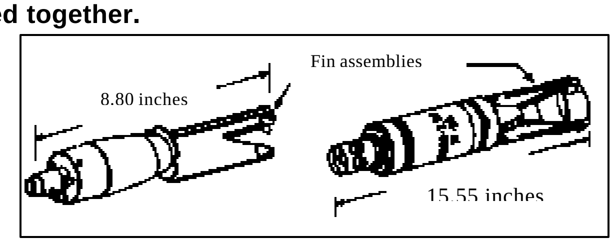


Figure 35. AMAT/AT-parachute stabilized submunitions.

Figure 36. AMAT/AT fin-stabilized submunitions.

(7) **AT area-denial submunitions (Figure 37) can be delivered by aircraft, artillery, and even some engineer vehicles. These FASCAMs all have magnetic fuzing. They will function when they receive a signal from metallic objects. These submunitions, similar to the APERS area-denial submunitions that are shown in Figure 31, also have antidisturbance and self-destruct fuzing. AT and APERS area denial mines are usually found deployed together.**



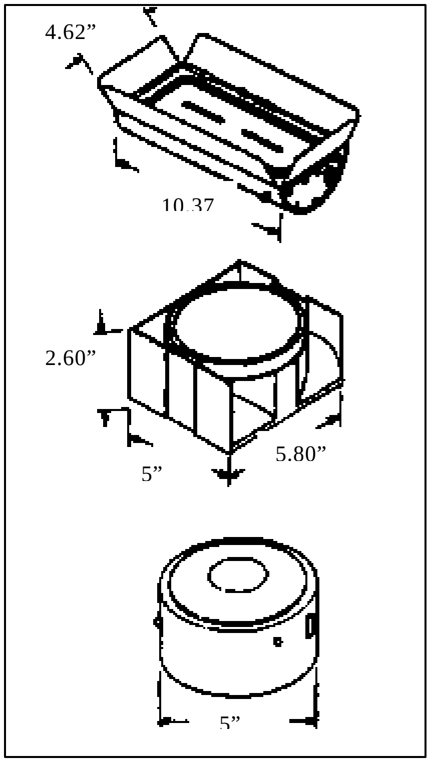


Figure 37. AT area-denial submunitions (FASCAM)

2. Type: Projected Ordnance.

a. Subgroup projectiles. All projected ordnance is fired from some type of launcher or gun tube. Projected ordnance falls into the following five subgroups: projectiles, mortars, rockets, guided missiles, and rifle grenades.

(1) Artillery projectiles include all ammunition used in weapons of caliber greater that 0.70 inch. They may be solid metal, or they may be filled or partially filled with an explosive, chemical, or nuclear warhead, or with submunitions. Some projectiles will not detonate on impact after becoming armed. The soldier must not attempt to move or disturb these items. On spin stabilized projectiles, engraved rotating bands indicate that the projectile has been fired. On fin stabilized projectiles, it must be assumed that they have been fired and have very sensitive fuzing and should not be moved or jarred.

(2) An artillery projectile can generally be described as a steel container having a cylindrical body with a rounded or pointed nose.

(3) Projectiles like bombs can have impact or proximity fuzing. They can also be fuzed with time-delay fuzing that functions at a preset time after firing. For safety reasons, all projectiles should be considered as having proximity fuzing. Getting too close to proximity fuzing will cause the fuze to function, and the projectile will blow up. Depending on the type of filler and the design of the projectile, the fuze can be in the nose, or in the base of the projectile.

(4) Projectiles that maintain their stability in flight by means of spin imparted by rotating bands are classified as spin stabilized projectiles. These projectiles may have one or more rotating bands located to the rear of the center of gravity. The projectile shown in Figure 38 is spin-stabilized. Projectiles stabilized in flight by fins are classified as fin-stabilized. Fin stabilized projectiles may have fixed fins, as shown in Figure 39 and figure 41, or folding fins, as shown in Figure 40 and Figure 41.

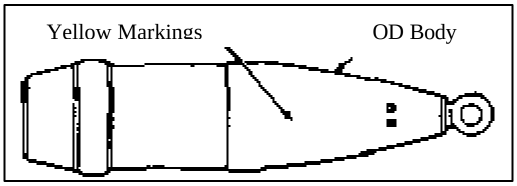


Figure 38. Spin Stabilized artillery projectile.

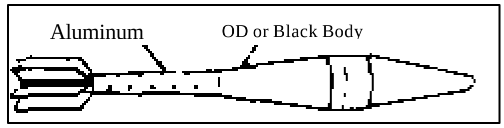


Figure 39. Fixed-fin artillery projectile.

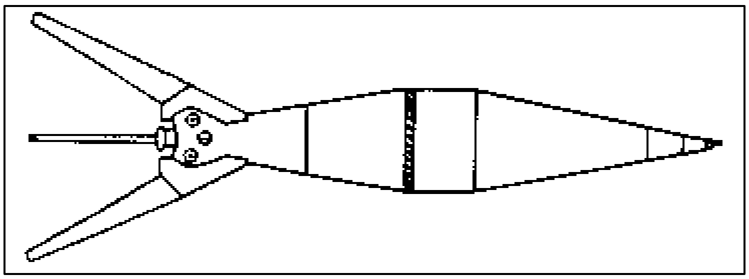


Figure 40. Folding-fins artillery projectile.

(5) Projectiles can range from about 15mm to 280mm in diameter, and may vary in length from 2 to 11 times the diameter of the body.

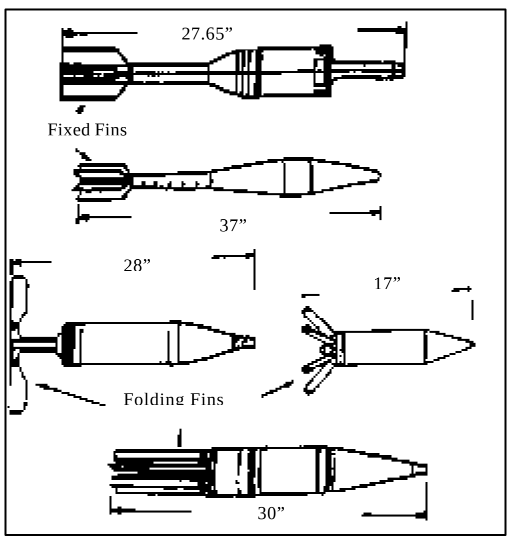


Figure 41. Fin-stabilized projectiles.

(6) Rocket-assisted projectiles, like the ones shown in Figure 42 and Figure 43 have a small rocket motor to extend their range.

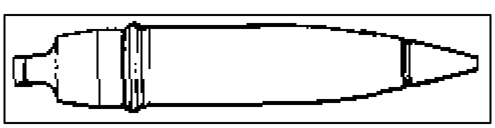


Figure 42. 105mm rocket-assisted artillery projectile.

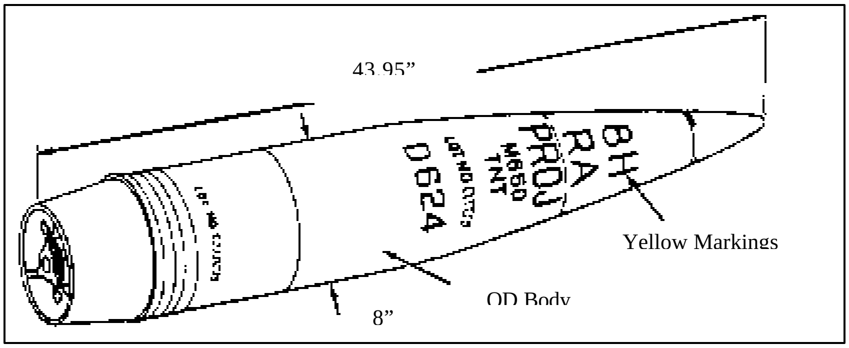


Figure 43. 8-inch (402mm) rocket-assisted artillery projectile.

b. Subgroup mortars.

(1) Most mortar shells are constructed of thin-wall steel tubing. They may have a cylindrical shape with a long, tapered base and a short ogival nose, or they may be egg or teardrop-shaped, as shown in Figure 44 and Figure 45. Mortar shells may range in size from 45mm to 380mm in diameter. All unexploded projectiles are to be considered armed. If portions of the projectile are buried with the tail protruding from the ground, do not try to remove it by pulling on the tail assembly.

(2) Flight is stabilized by spin or by fins. Spin stabilized projectiles, like the one shown in Figure 44, have a rotating disc near the base that expands into the rifling of the mortar tube when the round is fired. The rotating disc imparts spin to the projectile to stabilize it in flight. Fins are attached to the base of projectiles fired in smoothbore mortar tubes to stabilize the projectiles in flight. A fin-stabilized mortar shell is shown in Figure 45.

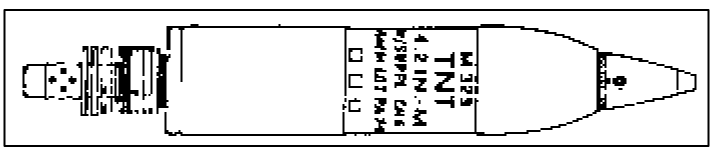


Figure 44. 4.2 inch Mortar

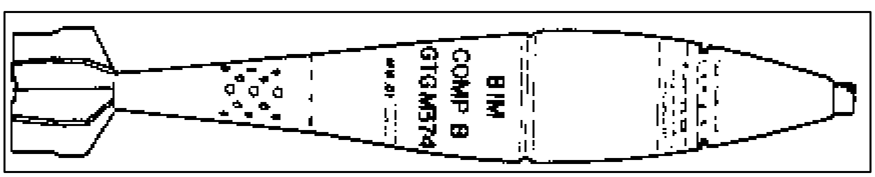


Figure 45. 81mm Mortar

c. Subgroup rockets. A rocket can be defined as a self-propelled projectile. Unlike guided missiles, rockets cannot be controlled in flight.

(1) Military rockets consist of a warhead, a motor, a fuze, and a fin assembly. Rockets presently in use range from 1 inch to 34 inches in diameter. They can range in length from 1 foot to over 9 feet. Unexploded rockets present the same hazards as unexploded artillery projectiles, and the same precautions apply. They are stabilized in flight by fins, or canted nozzles, that are attached to the motor.

(2) There is no standard shape to identify a rocket. Some rockets are shaped like artillery projectiles, with cylindrical bodies, ogival noses, and front and rear bourrelets. Other rockets have head assemblies that are cylindrical, tapering, concave, or convex, with a flat or a rounded nose. The warhead assembly is attached to the rocket motor, which is long, cylindrical, and has a set of fins attached at the end. Some motors may be smaller in diameter than the warhead. Figures 46 and 47 are examples of military rockets.

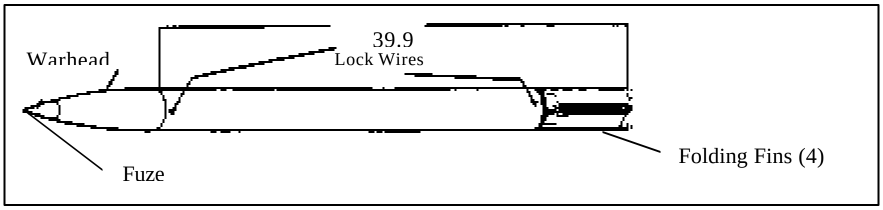


Figure 46. Aircraft rocket.

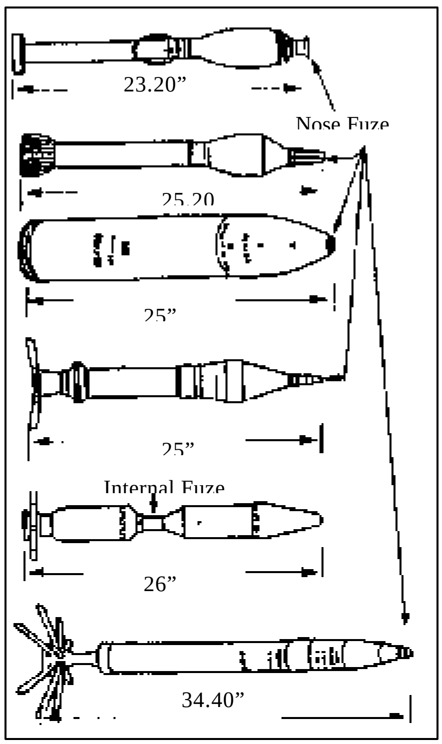


Figure 47. Rockets.

(3) Fuzes can be delay, nondelay, point-detonating, base-detonating, proximity, self-destruct, or combinations of these types.

(4) The warhead can be filled with explosives, toxic chemicals, WP, submunitions, CS, or illumination flares.

(5) Rockets can be launched or fired from individual weapons (such as the light antitank weapon (LAW) system), see Figure 48, aircraft, mobile-launch vehicles, or stationary launch pads.

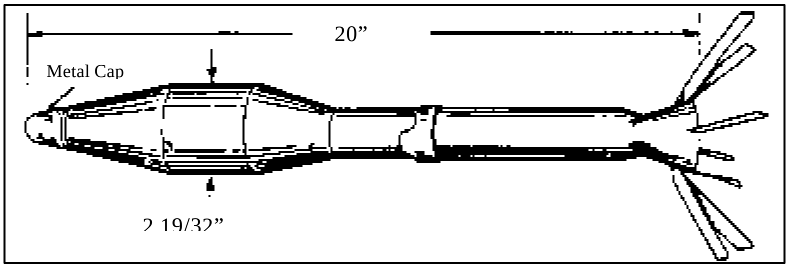


Figure 48. LAW Rocket.

(6) Some rockets are spin stabilized. Unlike projectiles and mortars, these rockets do not have rotating bands. Instead, as shown in Figure 49, their motor nozzles are slanted to produce spin. The presence of motor nozzles, or venturies, in the rear of the rocket motor can be used for positive identification purposes for this type of ordnance. Generally, the rocket motor will not create an additional hazard, because the motor is usually burned out shortly after the rocket leaves the launcher.

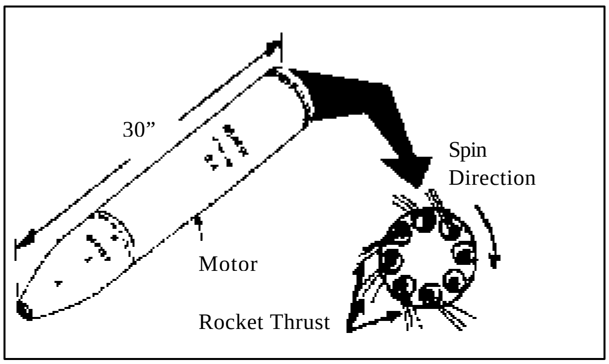


Figure 49. Spin-stabilized rocket.

d. Subgroup guided missiles. Guided missiles are like rockets in that they consist of the same parts. The difference is that the missiles are guided to their target by various guidance systems.

(1) Guided missiles allow for control of the munition after firing. This includes command disable or destruction on some missiles. The tube-launched, optically-tracked, wire-guided (TOW) missile, shown in Figure 50, is a typical small antitank (AT) guided missile with a range of up to 2,000 meters.

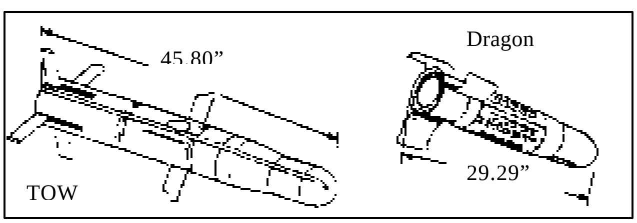


Figure 49. TOW missile

(2) Larger missiles, such as the phased-array tracking radar intercept on target (PATRIOT and the Sparrow are guided by radar to their target, see Figure 51. The radar may be internal to the missile, like the PATRIOT , or external, like the Sparrow, which uses the airplane’s radar system. Guided missiles are usually stabilized in flight by fins that are controlled by internal

electronics. Guided missiles have internal, proximity fuzing. Therefore, do not approach any guided missile you find lying on the battlefield.

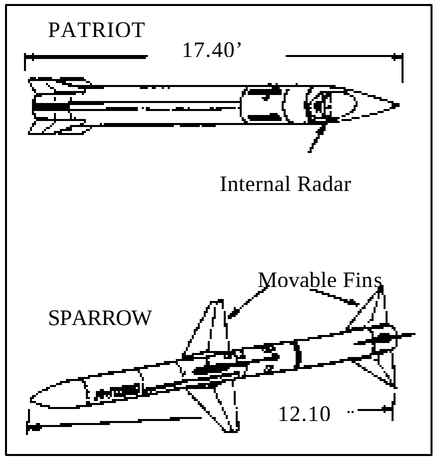


Figure 51. PATRIOT and Sparrow guided missiles.

e. Subgroup rifle grenades.

(1) Rifle grenades, unlike hand grenades, are projected only from the service rifle and are not to be thrown. They have five functions: AT, APERS, signaling, screening, and incendiary.

(2) Smoke and streamer grenades (shown in Figure 52) are of the burning type and have vent holes.

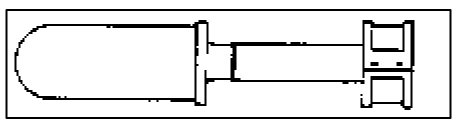


Figure 52. U.S. M23 rifle smoke grenade.

(3) The AT rifle grenades (shown in Figure 53 and Figure 54) is used to destroy armor. This is done with a shaped charge.

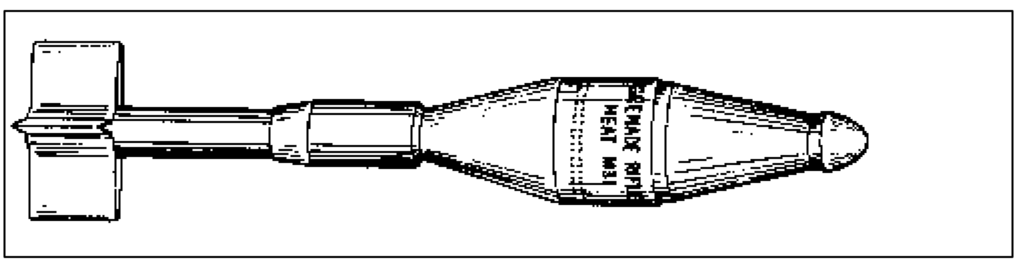


Figure 53. U.S. M31 AT rifle grenade.

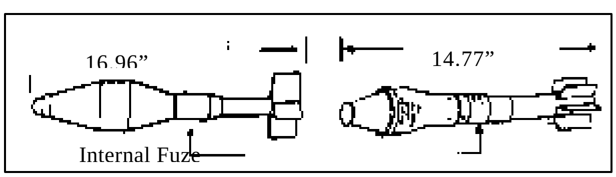
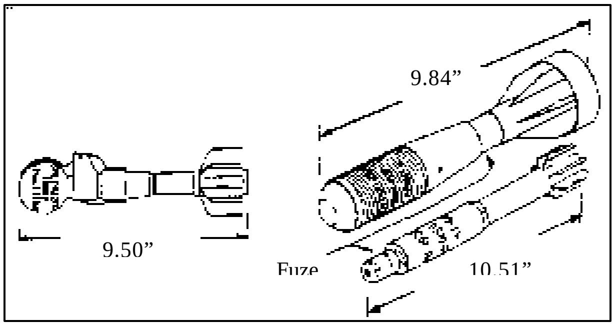


Figure 54. AT rifle grenades.

(4) The APERS frag grenade is similar to the frag hand grenade, but has a fin assembly, as shown in Figure 55 and Figure 56.



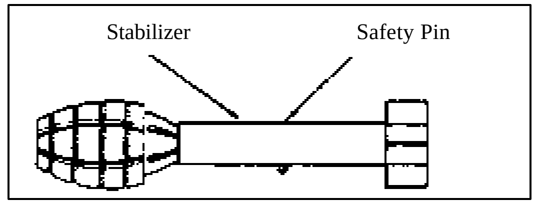


Figure 55. U.S. M17 Frag rifle grenade. **Figure 56. APERS rifle grenades.**

(5) White phosphorus (WP) smoke rifle grenades (shown in Figure 57) are of the burning type.

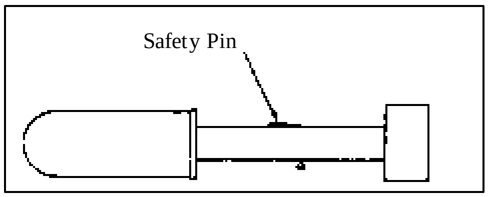


Figure 57. U.S. M19 WP smoke grenade.

(6) A grenade projection adapter is shown in Figure 58.

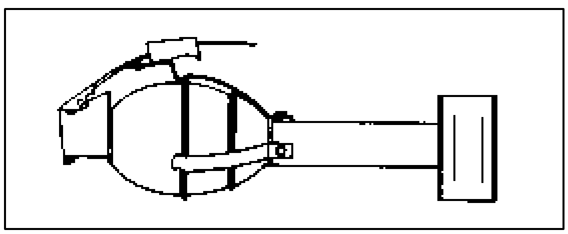
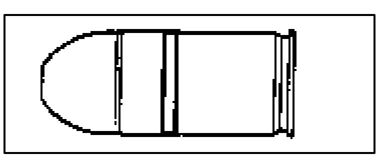


Figure 58. M1A2 grenade projection adapter.

(7) The 40mm grenade system consists of small projectiles, fired from a 40mm grenade launcher, with a range up to 450 meters. This system is also highly versatile. Its munitions include HE frag, HEAT, DP, riot control, smoke, signal, APERS shot, bounding ICM, WP, and practice. The HE frag (shown in Figure 59) is the most common grenade used.



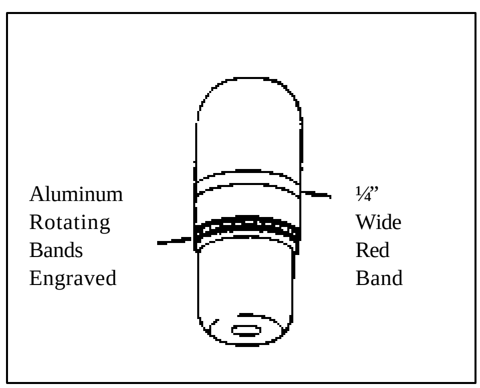


Figure 59. Typical U.S. 40mm grenade. **Figure 60. Typical U.S. riot control grenade.**

(8) The chemical round for the 40mm grenade system is shown in figure 60. It contains CS tear gas. This projectile is made of aluminum, with a red band in the middle of the body and a vent hole in the base.

3. Type: Thrown ordnance. Commonly known as hand grenades, thrown ordnance can be classified by use as follows: fragmentation (also called defensive), offensive, antitank, smoke, and illumination. Hand grenades are small items that may be held in one hand and thrown.

DANGER

Moving, Jarring, or otherwise disturbing a grenade may cause the item to explode.

DANGER

Never pick up a grenade you find on the battlefield, even if the spoon and safety pin are still attached. All grenades found lying on a battlefield should be considered booby-trapped.

(a) A hand grenade consists of a body, a fuze with a pull ring and safety clip assembly, and a filler. There are several types of hand grenades, as follows:

(1) Frag grenades are the most common type of grenade and may be used as offensive or defensive weapons. See Figure 61 and Figure 62. They have metal or plastic bodies that hold an explosive filler. These grenades produce casualties by high-velocity projection of fragments when they blow up. The fragmentation comes from the metal body or a metal fragmentation sleeve that can be internal or attached to the outside of the grenade. These grenades use a burning delay fuze that functions 3 to 5 seconds after the safety lever is released.

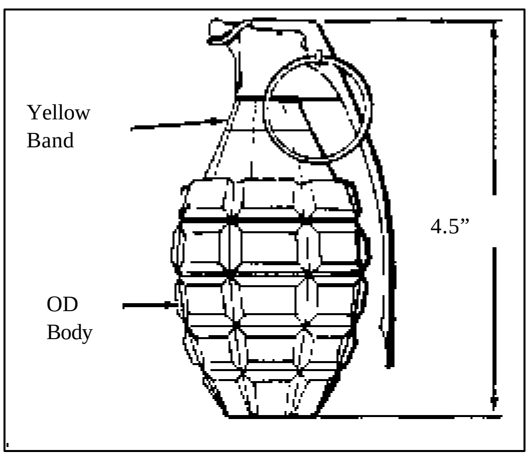


Figure 61. U.S. Frag grenades.

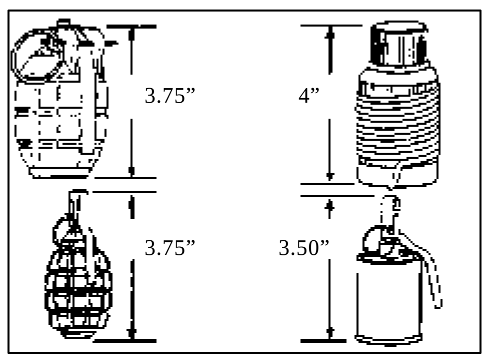


Figure 62. Frag grenades.

(2) Offensive grenades have a plastic or cardboard body. See figure 63. They are not designed to have a lot of fragmentation. Their damage is caused form over pressure of the explosive blast. These grenades use a burning-delay fuze that functions 3 to 5 seconds after the safety lever is released.

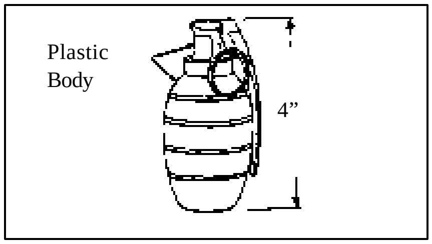


Figure 63. Offensive grenade.

(3) Illumination grenades are used for illuminating, signaling, and as an incendiary agent. See figure 64. The metal body breaks apart after the fuze functions and dispenses an illumination flare. This type of grenade uses a burning-delay fuze that functions 3 to 5 seconds after the safety lever is released.

(4) AT grenades are designed to be thrown at tanks and other armored vehicles. They have a shape-charge explosive warhead and are stabilized in flight by a spring-deployed parachute or a cloth streamer. See Figure 65. These grenades use impact fuzing.

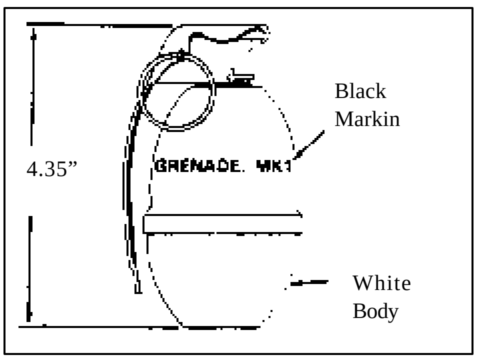


Figure 64. U.S. Illumination grenade.

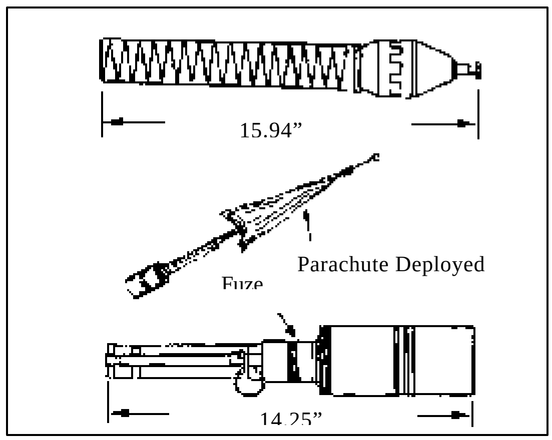


Figure 65. AT grenades.

(5) There are two types of smoke grenades: bursting and burning. See figure 66. They may be made of rubber, metal, or plastic. Bursting-type smoke grenades are filled with White Phosphorous (WP) and blow up when the fuze functions. These grenades use a burning delay fuze that functions 3 to 5 seconds after the safety lever is released. Burning-type smoke grenades produce colored smoke. This type of grenade uses an instant action-action fuze. There is no delay once the spoon is released. This is the same type of grenade that is used to dispense riot-control agents (such as CS).

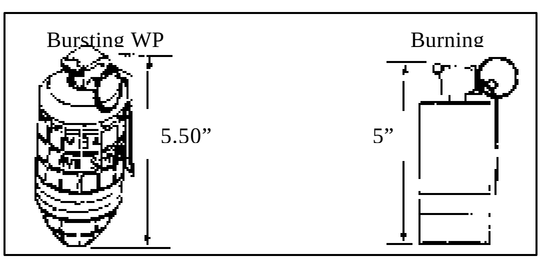


Figure 66. Smoke grenades.

4. **Type: Placed ordnance.** Placed ordnance is commonly referred to as land mines. Land mines may be hidden, buried or placed on the surface. Visual detection of land mines may be difficult at best. If you come to a suspected minefield, report it as a minefield on an obstacle report. For further information on reporting land mines, refer to FM 20-32.

DANGER

All mines should be considered to be booby trapped.

DANGER

Many mines are fuzed with magnetic or seismic detonators. Your approach may detonate them. All observation should be done with binoculars at the greatest distance possible from which you can gather the required information.

(a) Placed land mines are designed to destroy vehicles and to inflict casualties on personnel who step or drive on them. There are three basic types of land mines: AT, APERS, and chemical.

DANGER

These mines may utilize a tilt rod or electrical fuzing.

(b) AT mines are much larger than APERS mines and usually have pressure or tilt-rod fuzing. However, some AT mines also have magnetic-sensitive fuzing. Some of the more modern AT mines have plastic bodies, which make them hard to detect with a metallic mine detector. The variety of AT mines shown in Figure 67 all function from direct pressure from a tank or vehicle. The mines shown in Figure 68 use a tilt-rod fuze that sticks out of the ground. When the rod is moved or pushed over, the mine blows up.

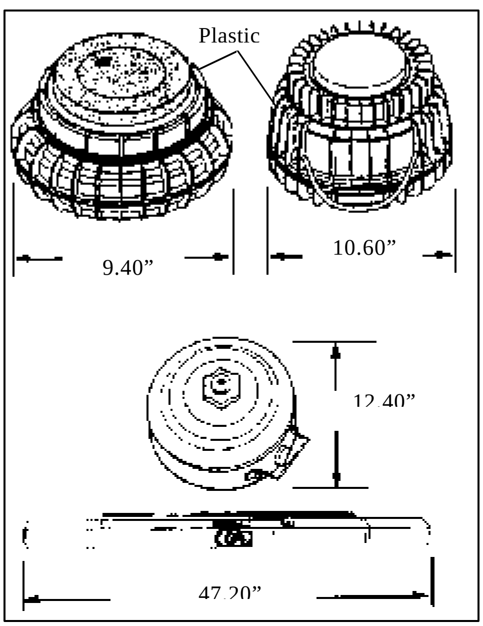


Figure 67. AT pressure-fuzed mines.

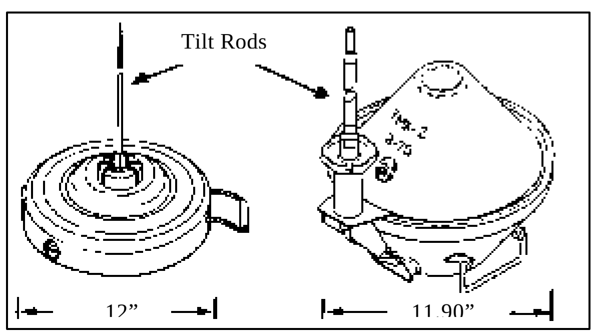


Figure 68. AT tilt-rod fuzed mines.

(c) APERS mines are generally small and come in different shapes and sizes. Some APERS mines are even made of wood. Some APERS mines are designed to function when stepped on. Other APERS mines are setup to function by using a trip wire laid out across a path or road. When the trip wire is pulled or cut, the fuze functions. Some APERS mines, such as the U.S. Claymore Mine, may be set up to function by command detonation.

(1) Typical blast-type APERS mines are shown in Figure 69 and Figure 70. They normally consist of a small container filled with HE and a fuze. The body may be made of plastic, metal, wood, ceramic, or cardboard.

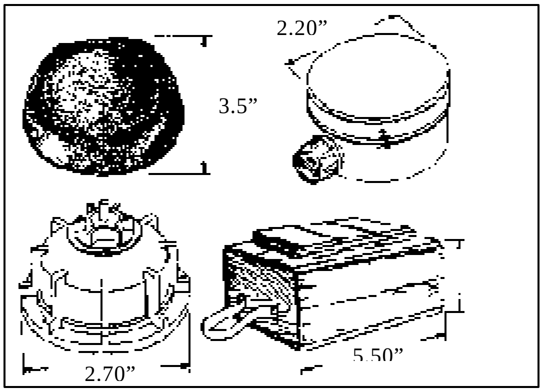


Figure 69. APERS pressure-fuzed, blast-type mines.

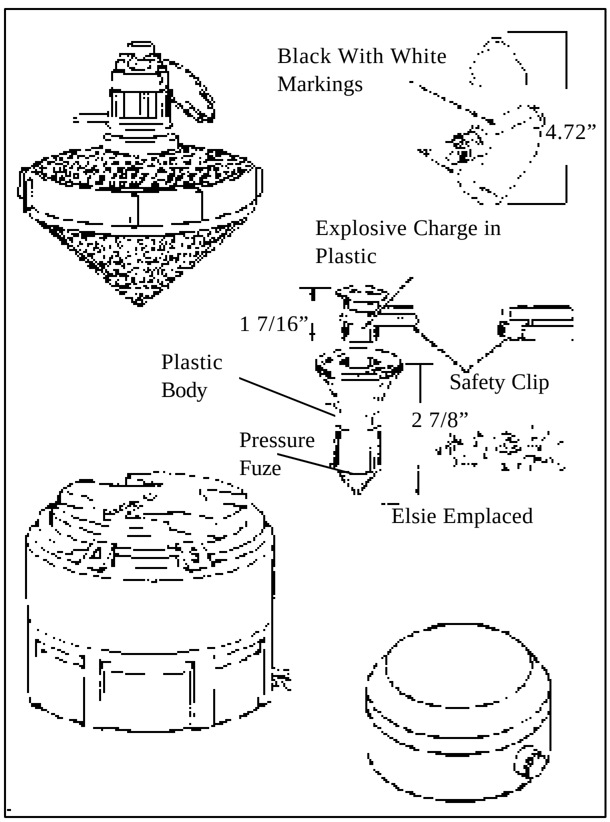


Figure 70. APERS mines.

(2) Typical fragmentation APERS mines are shown in Figure 71. These mines are normally made of plastic with metal balls embedded in the plastic. They may be fixed or bounding type mines.

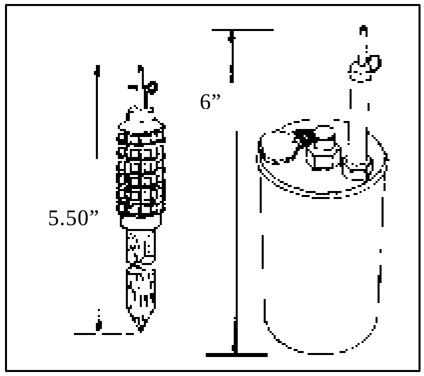


Figure 71. APERS trip wire-fuzed bounding mines.

(d) Chemical mines produce casualties by blast and by toxic agents. The two U.S. chemical mines are the M23 (shown in Figure 72) and the one-gallon gas mine (shown in Figure 73).

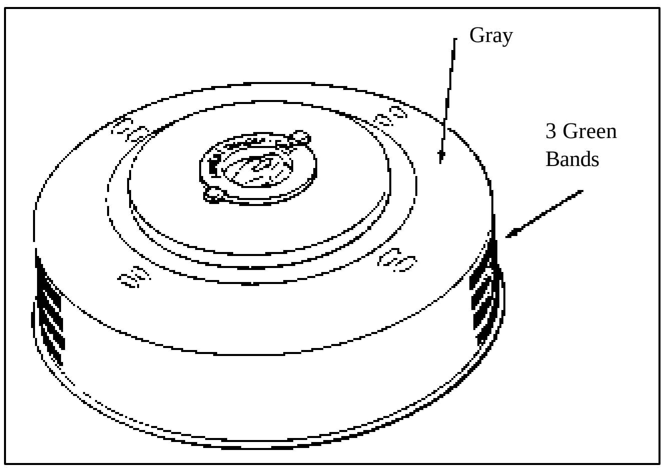


Figure 72. U.S. chemical land mine, M23, VX.

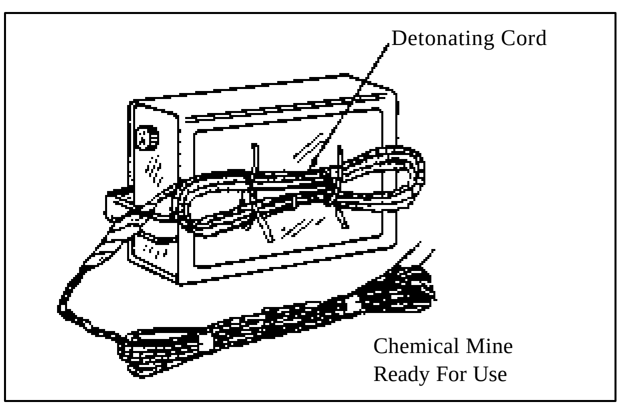


Figure 73. U.S. 1-gallon land mine, HD.

TAKE IMMEDIATE ACTION BASED ON CONFIRMATION OF AN EXPLOSIVE HAZARD

All UXOs found on the battlefield affect maneuver and mission capabilities. When you find a UXO, you must make some immediate decisions. These decisions will depend on your current mission, the size and location of the UXO, and your unit's capabilities. Figure 74 shows a decision chart to help you decide. This information is also in GTA 9-12-1, which is available at your local TASC.

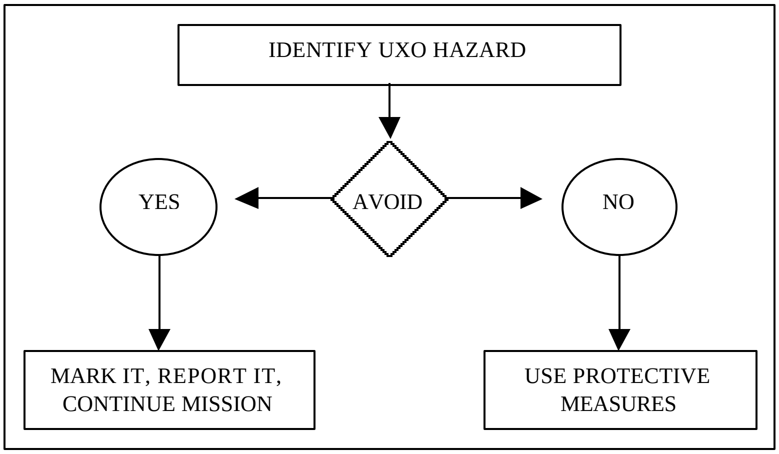


Figure 74. Decision Chart.

If at all possible, avoiding/bypassing the UXO hazard is the safest option to take for personnel and equipment. If the UXO hazard is left form a recent enemy attack, you must consider protecting your personnel and equipment by extracting them from the area before another attack is targeted on you.

If the mission cannot be accomplished due to presence of the UXO and the hazard cannot be avoided/bypassed, protective measures must be taken to reduce the hazard to personnel and equipment.

Regardless of the option you choose, the location of the UXO must be clearly marked with UXO markers and the hazard reported to your next higher headquarters.

1. Confirm the presence of UXO.

a. The danger to the soldier who finds a UXO can be lessened by strict observance of basic safety precautions along with the use of sound judgment.

(1) Never divide responsibility in any phase of a UXO incident at the site.

(2) Do not allow unneeded personnel on the site.

(3) Upon identification of the UXO, retire to a safe distance and make certain that the correct evacuation measures are being enforced. Do not remain in the immediate danger area any longer than absolutely necessary.

(4) Do not touch or disturb the UXO. Disturbances, either mechanical or otherwise, may cause the UXO to detonate.

(5) If the presence of liquid droplets, dead animals, dissolved paint, or peculiar odors is detected, the presence of chemical agents may be assumed. Put on your protective equipment immediately.

(6) Do not touch any loose wires or attached components.

(7) Do not attempt to remove parachutes from any UXO.

(8) Leave recovery to Explosive Ordnance Disposal (EOD) personnel.

(9) Do not have in your possession any metallic object or tool that may cause magnetic-influence firing devices to function.

(10) Do not make any sharp, loud noises that could cause acoustic firing devi ces to function.

(11) Identify the UXO from a distance using binoculars.

(12) Approach the item of UXO from upwind if chemical ordnance is suspected.

(13) When possible, wait one hour before approaching the UXO.

(14) Do not use radio signals in the immediate area. They can cause explosions.

2. Protective Measures.

a. **Mark the UXO.**

(1) Marking a UXO hazard is just as important as marking other hazard areas such as NBC areas, minefields, and booby-trapped areas. All of these hazards are marked by using triangular signs, if readily available, that by their background color indicate the danger involved. The standard UXO marker is shown in Figure 75. The background is red with a white bomb inset. It has the same dimensions as the other markers.

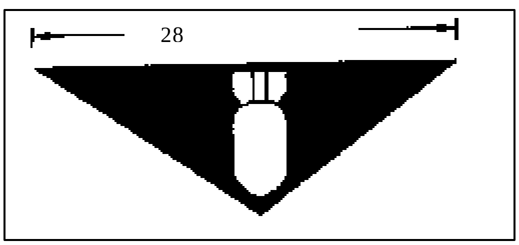


Figure 75. Standard UXO Marker.

(2) The UXO marker is placed above ground at waist level (about 3 feet) with the bomb pointing down as shown in Figure 76. The marker should be placed no closer to the hazard than the point where you first recognized the UXO hazard. The marker should be attached to a stake (Figure 76), a tree, or other suitable holder. Just be sure that the marker is clearly visible.

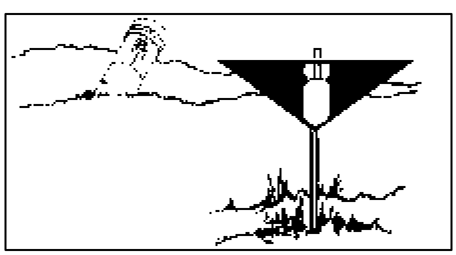


Figure 76. Marking a UXO with a standard marker.

(3) You should also mark all logical approach routes to the area. If the hazard is near a road, as a minimum, put a marker on each side of the road approaching the UXO. If there is a large concentration of UXO hazards such as submunitions, mark the area as you would a scatterable

minefield, with markers placed about every 15 meters around the area. Refer to FM 20-32 for additional information on marking minefields.

(4) As a general rule, the UXO hazard itself must be easily seen from any of the markers. This helps to keep others away from the hazard. It also helps the EOD team to find the hazard.

(5) If standard UXO markers are not available, you may use other suitable materials (such as engineer tape or colored ribbons). Ensure that the same color is used to avoid confusion. When using other materials, the same principles used for the standard markers apply for placement of the makeshift markers. That is, they should be placed about 3 feet off the ground and easily seen from all approach routes. See Figure 77.

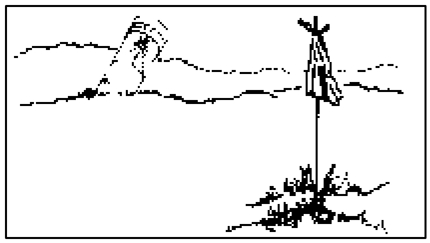


Figure 77. Marking UXO with alternate type of material.

3. **Evacuate:**

(a) Evacuation of all nonessential personnel and equipment is the best protective measure. The evacuation distances given in Table 1 provide a reasonable degree of safety for unprotected personnel and equipment. These distances are based on your estimate of the amount of explosive filler in the UXO. If protective barricades are used around the UXO, these distances can be reduced.

(b) The general rule for estimating the amount of explosive in an ordnance item is as follows: assume that 50 percent of the total ordnance weight equals the net explosive weight. For example, a 500-pound bomb would be calculated to have 250 pounds of explosive. According to Table 1, the safe distance for unprotected personnel is 625 meters

NET EXPLOSIVE WEIGHT IN POUNDS	APPROXIMATE NEW CUBE ROOT	SAFE DISTANCE IN METERS	SAFE DISTANCE IN FEET
27 (and under)	3.00	300	975
30	3.11	310	1,008
35	3.30	330	1,073
40	3.50	350	1,148
45	3.6	360	1,170
50	3.75	375	1,218
100	4.75	475	1,544
150	5.5	550	1,788
200	6.00	600	1,950
250	6.25	625	2,031
300	6.75	675	2,194
350	7.00	700	2,275
400	7.25	725	2,356
450	7.75	775	2,420
500	8.00	800	2,600
600	8.5	850	2,763
700	8.9	890	3,026
800	9.3	930	3,162

900	9.65	965	3,281
1,000	10.00	1,000	3,400

Table 1. Evacuation Distances (distance fragments may travel if UXO explodes).

(c) After all personnel and equipment are evacuated, movement within the area should be kept to essential operations only. If equipment cannot be evacuated, only mission-essential personnel should be allowed in the area. The equipment should be protected by barricades and personnel should wear all protective equipment.

(1) Evacuate the area around the UXO item immediately upon its discovery, even if it is not yet a confirmed UXO item.

(2) Block off danger areas to keep unauthorized and unneeded personnel out of the area.

(3) Stop and reroute traffic to avoid the danger zone and to be sure that traffic vibrations do not disturb the UXO.

(4) Open doors and windows within the danger area to reduce glass breakage and other effects of blast and suction.

(5) Evacuate important supplies, machinery, and records if their loss will hurt the war or defense effort.

4. **Isolate.** Sometimes, for mission-related, operational, or other reasons, you cannot evacuate personnel and/or equipment or you cannot leave a particular area. When this happens, you must isolate either your assets (personnel, equipment, and operations) from the UXO or isolate the UXO form your assets.

5. Barricade.

a. If your unit is stationary, evacuate all nonessential personnel and equipment out of the hazard area. Equipment that cannot be moved must be protected with barricades. Personnel who cannot be evacuated from the area must also be protected from the hazard. You can do this by reinforcing the fighting positions on the side facing the hazard and by adding overhead cover.

b. A barricade is an artificial barrier that provides limited protection by channeling the blast and fragmentation from the threatened area. Barricades may also be used to lessen the effect of the blast and to reduce the size of the evacuation area. When determining if barricades are needed, you must estimate the probable damage that would result if the UXO were to explode. Building artificial barricades is very time consuming and requires a large number of sandbags. Depending on the size of the UXO, barricades can be built around the UXO to protect the entire area, or they can be built next to the equipment or areas that cannot be evacuated. Use the following general guidelines when building barricades:

(1) Calculate the total destructive power of the UXO hazard. Multiply the number of items by their net explosive weight (NEW).

(2) Determine which assets cannot be moved or evacuated from the area safely. For those assets that cannot be moved or evacuated, decide on the type of barricade(s) you will need to protect your assets.

(3) Determine how many personnel are available to help build barricades. Use the absolute fewest personnel. Determine what equipment you can use. If earth-moving equipment is available, you can build earth barriers in place of sandbag barricades.

(4) Calculate the number of sandbags you will need or that are already available to build barricades. Personnel evacuated from the UXO area can fill sandbags and transport them to the barricade site.

(5) Make sure that all personnel actually building barricades are wearing all available safety equipment. This safety equipment includes a Kevlar helmet. a flak vest, and hearing protection.

c. Placement and Size of Barricades.

(1) The barricade should be built no closer to the UXO than the height for the barricade plus 3 feet. Further guidance on the height for barricades is provided later in this section. For example, the barricade shown in Figure 78 is 5 feet tall. By adding an additional 3 feet, the barricade is built no closer than 8 feet to the UXO.

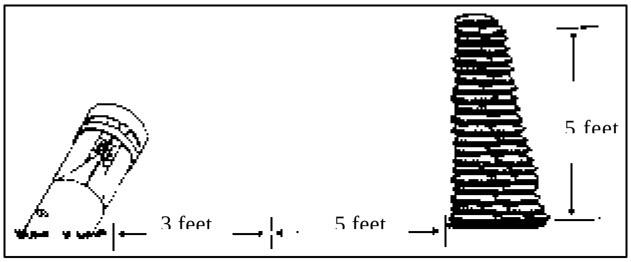


Figure 78. Placement distance for barricade.

(2) When possible, build the barricade between the building and/or the equipment to be protected and the UXO. By positioning the barricade in this location, personnel who are in or around the building or who are using the equipment will be afforded the greatest protection from the blast and flying fragments. See Figure 82.

(3) When building a barricade, the sandbags must be interlocked for stability. See Figure 79. Sandbags that are not interlocked will reduce protection and make the barricade unstable.

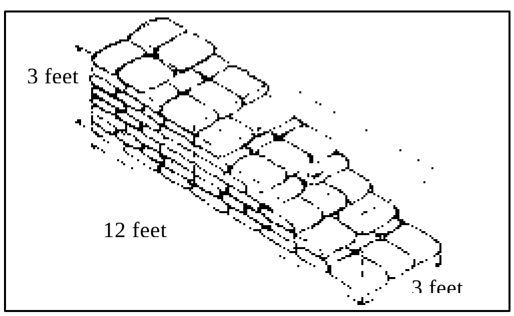


Figure 79. Interlocking sandbags.

(a) **Small UXO.** For small UXO such as missiles and rockets less than 70 millimeters in diameter, for projectiles less than 75 millimeters in diameter, and for submunitions and grenades, a double-wall thickness of sandbags should surround the area of the UXO. The sandbags must be stacked to a height of at least 3 feet and should be thick enough to protect personnel and equipment from the blast and fragmentation. This type of barricade may be semicircular or circular. Types of barricades are discussed later in this section.

(b) **Medium UXO.** For medium-sized UXO such as missiles, rockets, and projectiles up to 200 millimeters in diameter, and for large sized placed munitions on the surface, a four- or five-wall thickness of sandbags should surround the area. The sandbags must be stacked to a height of at least 5 feet in order to protect assets. This type of barricade is usually semicircular.

(c) **Large UXO.** Large UXO such as projectiles, missiles, and general-purpose bombs are too large for effective barricades to be built around them. In these cases, equipment and personnel activity areas would need to be barricaded. A wall barricade between the affected area and the UXO hazard provides the best and easiest protection.

d. **Barricade Types.** The three types of barricades are circular, semicircular, and wall. The type barricade that you use will depend on the UXO hazard and the area that requires protection.

(1) **Circular.** A circular barricade is the best choice for small UXO hazards, because it provides complete protection for personnel and equipment. A circular barricade that is 8 feet in diameter, 3 feet tall, and 3 sandbags thick would require approximately 400 sandbags. The barricade shown in Figure 80 will force the blast and fragmentation upward.

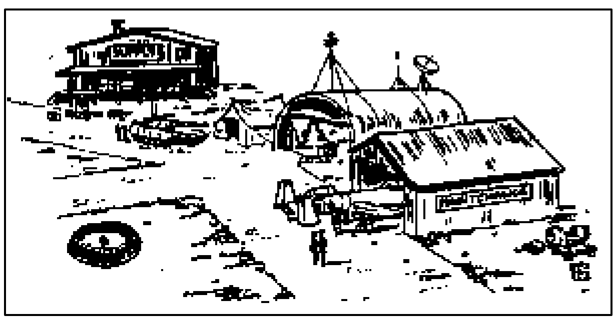


Figure 80. Complete circular placement of barricade.

(2) **Semicircular.** A semicircular barricade is used for small- and medium-sized UXO hazards. It will channel the blast and fragmentation through the open side and away from the protected area. See Figure 81.

(3) **Wall.** The wall barricade protects specific equipment or personnel areas. It is used when the UXO hazard is too large to contain by using a circular or semicircular barricade. The number of wall barricades you need will depend on how much equipment or how many personnel you must protect. A wall barricade that is 12 feet long, 6 feet high, and 3 sandbags thick would require 700 sandbags. As shown in Figure 82, the barricade should extend beyond and be at least as tall as the equipment or personnel areas to be protected. Equipment that is barricaded must still be usable. For example, the radar shown in Figure 82 must be left exposed in order to function.

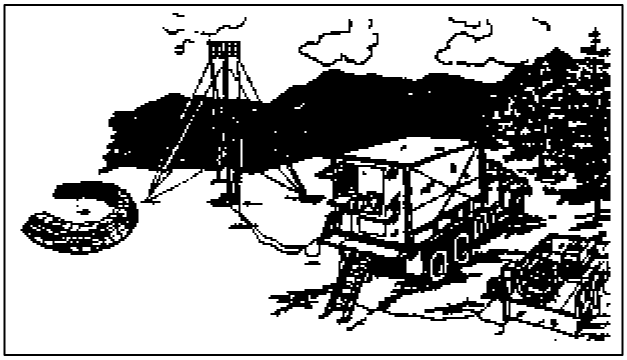


Figure 81. Semicircular placement of barricade.

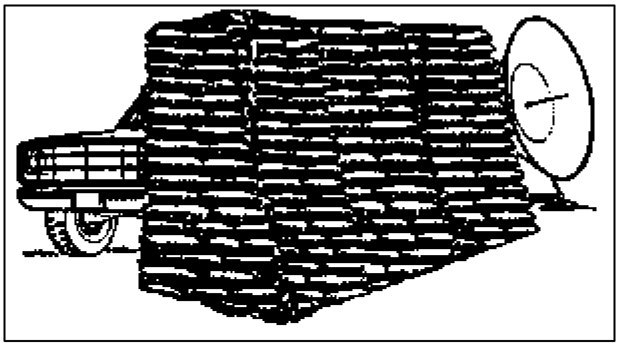


Figure 82. Wall barricade placement.

6. Self-extraction from UXO hazards.

a. The use of submunitions and scatterable mines on the modern battlefield will have a direct impact on mobility, survivability, and logistical support requirements. All units must be able to maintain their mobility despite these hazards. Our forces must be able to self-extract from submunition and scatterable mine threats in order to survive.

b. EOD units are responsible for the elimination of these threats from the battlefield, while engineer elements provide breaching and mine-clearing support for these threats. These elements will not be readily available to all units that receive submunition or scatterable mine attacks from the enemy. Any unit that cannot self-extract will risk being destroyed in place by follow-on attacks

c. Detection. Detection is the first step in extraction. Submunitions and scatterable mines are very small in size and are difficult to detect in optimum circumstances. In some terrain, such as dense foliage, tall grass, or uneven ground, many of them will go undetected. During periods of limited visibility or at night, detection is almost impossible. Combat vehicle personnel traveling cross-country in a buttoned-up vehicle will be at a great disadvantage, because they will not be able to see them or to avoid them.

d. Immediate actions.

(1) When an operating area becomes contaminated with submunitions or scatterable mines, a certain amount of confusion is understandable. Therefore, a recognized and rehearsed system of alerting personnel to the danger and orders on how to evacuate the area are essential. Alerting systems may include loudspeakers, radios, or runners. A combination of these systems may be the most effective.

(2) The unit field SOP should include procedures for evacuating personnel from an area and reestablishing operations at another location. An established and trained evacuation plan will reduce personnel and vehicle losses. The plan must be flexible so it can be adapted to fit the different scenarios and environments that might be encountered.

(3) When setting up operational bases or work sites, the UXO threat must be considered. Roads are critical for evacuation. Hard surfaced roads are the best evacuation routes and are also the easiest to clear. The evacuation plan should include procedures for unit elements to reconnoiter and mark clear paths or to link paths from other unit positions to their position and to the nearest hard surfaced road.

(4) A unit that has been directly fired on must presume that more fires are coming. The unit must be able to self-extract from the area in order to resume operations or be able to protect assets in order to continue the assigned mission. The extraction procedure resembles an in-stride breach as outlined in FM 20-32 and FM 90-13-1 or in FMFM 13-7 for the Marine Corps. Units that are conducting movement operations can use route clearance procedures to force a cleared lane through the area.

(5) Combat units that have the assets to conduct an in-stride breach can do so and reduce the hazard for follow-on forces and continue in the original direction of the march. Combat support (CS) and combat service support (CSS) units must rely on their operation order (OPORD) to designate alternate support areas. These units must employ their organic assets to reconnoiter and create cleared lanes in the direction of the alternate support location. Not all equipment may be retrievable. The emphasis should be placed on relocating personnel and operational equipment as quickly as possible.

7. Situational assessment.

a. After taking immediate actions to alert personnel, locate the submunitions or scatterable mines, and provide protection for personnel and equipment, the following operational situation and tactical factors should be assessed:

(1) Effect of the delay on the mission.

(2) Threat from direct and indirect fire. The risk of casualties from direct or indirect fire may be greater than that from the submunitions or scatterable mines.

(3) Type of terrain. The terrain determines the effectiveness of submunitions or scatterable mines, their visibility, and, consequently, their ability to be detected, avoided, or neutralized.

(4) Alternate routes or positions available.

(5) Degree of protection available.

(6) Availability of specialized support, such as EOD or engineer teams and equipment.

b. After assessing the situation, three main options are available, as follows:

(1) Accept the risk of casualties and continue with the assigned mission.

(2) Employ tactical breaching procedures and extract to alternate routes or positions.

(3) Employ preplanned alternate tactical plans according to the current OPORD.

8. Breaching techniques.

a. Hazardous areas must be bypassed if at all possible. When bypassing is not feasible, you must try to neutralize the submunitions and scatterable mines that prevent movement.

b. There is no single device or technique that will neutralize every submunition or scatterable mine in every situation. The differences in fuzing, self-neutralization, terrain, and unit mission mean that multiple techniques must be considered.

c. When employing breaching techniques, take all protective measures possible to protect personnel and equipment. Personnel who are not directly involved should be under cover, away from the area. Personnel who are directly involved must make use of all available cover.

d. The following extraction techniques should be considered in the order listed:

(1) Perform area reconnaissance, and mark a cleared route.
(2) Use engineer equipment to remove or neutralize items.
(3) Destroy items using explosive charges.
(4) Destroy items using direct-fire weapons.
(5) Contain the item by building barricades.
(6) Move UXO out of the way remotely.

DANGER

EMPLOYING BREACHING TECHNIQUES ON ORDNANCE OTHER THAN SUBMUNITIONS OR SCATTERABLE MINES IS NOT RECOMMEND. THE AMOUNT OF EXPLOSIVES INVOLVED WOULD CREATE MORE OF A HAZARD TO YOUR OPERATIONS THAN THE UXO ITSELF.

WARNING

PRIOR TO EMPLOYING BREACHING TECHNIQUES, MAKE SURE THAT NONE OF THE ITEMS ARE FILLED WITH CHEMICAL OR BIOLOGICAL AGENTS.

e. Engineer equipment (Heavy-Force Breaching).

(1) Using engineer equipment is the preferred method of breaching small submunitions and scatterable mines. This procedure allows lanes in the direction of the alternate support location. Not all equipment may be retrievable. The emphasis should be placed on relocating personnel and operational equipment as quickly as possible.

(2) Three major disadvantages to heavy-force breaching are as follows:

(3) Equipment may be damaged or operators injured. If either happens, extraction through the area will be hampered.

(4) Equipment may only partially clear the area, requiring further clearance procedures.

(5) Equipment may bury some submunitions or scatterable mines, which would keep them from being detected while using the evacuation route.

f. Explosive Charges.

(1) Mine-Clearing Line Charge.

(a) The mine-clearing line charger (MICLIC) is a rocket-propelled explosive line charge used to reduce minefields containing single-impulse, pressure-activated AT mines and mechanically activated APERS mines. It has limited effectiveness against magnetically activated mines, including scatterable mines and those containing multiple-impulse or delay-time fuzes.

(b) The MICLIC will explosively clear a path through an area. Several MICLICs may be required in the same area to ensure that a wide enough path is cleared.

(c) Three major disadvantages to using MICLICs are as follows:

(1) The explosive charges may not be close enough to the submunition or scatterable mine to cause destruction. This can result in "kick outs" where submunitions or scatterable mines can be thrown away from the detonation, possibly towards your position.

(2) Further reconnaissance of the area is required prior to using the route for evacuation in order to detect those submunitions or scatterable mines that are still in place after using MICLIC.

(3) MICLIC cannot be used if detonation of the submunitions or scatterable mines will cause unacceptable damage.

g. Hand-placed Explosive Charges.

(1) This is the most effective way to clear an evacuation route. The explosive charges should be placed to the side of the UXO as close as possible without touching it. The explosive charge should be placed to the side of the UXO that is closest to the unit's position. This will direct most of the fragmentation away from the unit. Enough time fuse should be used to allow personnel to return to a safe area prior to the detonation.

(2) Four major disadvantages to using hand-placed charges are as follows:

(a) They are very labor intensive to use and expose personnel to a greater risk, especially if the submunitions use magnetic, delay, or trip-wire fuzing.

(b) Their use is very slow and time consuming, because all items must be detected, marked, and destroyed individually.

(c) They cannot be used if detonation of the submunitions or scatterable mines will cause unacceptable damage to the operational area and/or equipment.

(d) They should not be used in heavy concentrations of submunitions or scatterable mines. The detonations will cause "kick outs."

h. Direct-Fire Weapons.

(1) Submunitions and scatterable mines can be destroyed or disabled by the use of direct-fire service weapons. The goal of this procedure is to produce a disabling reaction that rapidly reduces or eliminates the designed fuze functioning of the submunition or scatterable mine. Service weapons such as the 5.56 millimeter, the 7.62 millimeter, the .50 caliber, and the 25 millimeter will most likely produce the desired effect. The person firing the service weapon should approach the UXO only close enough to be able to fire accurately. However, this person should never be closer than 25 meters to the item. When performing the direct-fire procedure, the aiming point is center mass. Single shots should be fired until the item is hit. On some larger items, multiple hits may be required to be sure that the submunition or scatterable mine has been disabled. Frontal protection is required for mounted and dismounted personnel. Figure 83 shows the dismounted procedure, while Figure 84, shows the light-vehicle mounted procedure with sandbags being used for frontal protection. If several persons are being used to clear a large area, ensure that each person is protected sufficiently from all areas. No one person should be closer than 25 meters to any item being engaged.

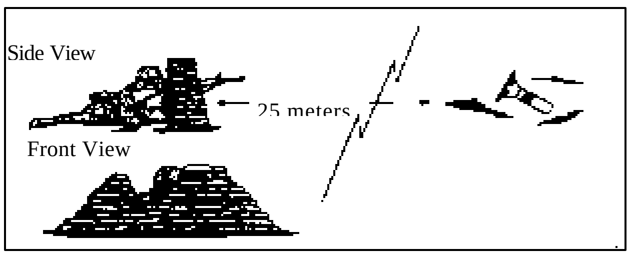


Figure 83. Dismounted direct-fire procedure.

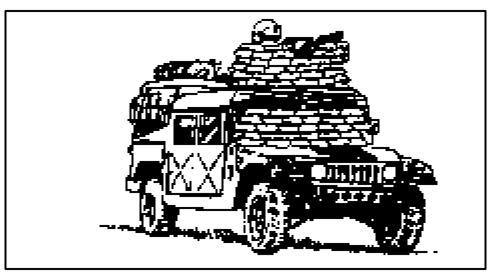


Figure 84. Light-vehicle mounted direct fire procedure.

(2) Three major disadvantages to direct-fire destruction are as follows:

(a) It is very slow and time consuming. Each item must be individually located, and each person can only engage one target at a time.

(b) Some submunitions are too small to engage effectively with direct-fire weapons from a distance of 25 meters.

(c) The terrain has a major affect on this procedure. Because submunitions and scatterable mines are so small, it does not take very much vegetation or loose dirt to hide them.

i. Containment.

(1) Each submunition or scatterable mine contains less than two pounds of explosives. Thus, by using engineer equipment, one or two items can be contained by building barricades or by placing loose fill dirt on top of them. This procedure is recommended for use only where equipment must be recovered and no other procedure is acceptable. Placing fill dirt on top of the UXO may cause a detonation that could damage the equipment or injure the operator.

(2) There is one major disadvantage to containment. Building barricades is time consuming and thereby exposes a large number of personnel to the UXO.

j. Remote movement.

(1) If the submunition or scatterable mine must be moved, it must be moved remotely using grapnel hooks, rope, or some other suitable material. To begin this procedure, there must be a distance of at least 50 meters between the person moving the UXO and the UXO itself.

(2) Three major disadvantages to remote movement are as follows:

(a) Movement of the item can cause detonation.

(b) Personnel must approach the item in order to attach necessary materials.

(c) The UXO will be pulled toward the person moving it.

Report Explosive Hazard

UXO on the battlefield have an enormous affect on command and control decisions for battle planning. The location of these hazards is vital to the command and control elements when projecting movement and support of combat units. UXO hazards also have a direct impact on combat capabilities of any element that encounters them. To assist commanders, an effective UXO reporting system must be in place and maintained to allow commanders to concentrate EOD and engineer assets according to priorities and battle plans.

1. The UXO spot report is a detailed, swift, two-way reporting system that makes clear where the UXO hazard areas are, what their priorities are, and which units are affected by them. The report is used to request help in handling a UXO hazard that is beyond a unit's ability to handle and that affects the unit's mission. The report helps the commander set priorities based on the battlefield saturation.

2. The UXO spot report is the first-echelon report that is sent when a UXO is encountered. Information about this report is also found in GTA 9-12-1 and in the supplemental information section of the signal operating instructions (SOI), where it is just behind the request for medical evacuation (MEDEVAC). The report consists of nine lines. The information must be sent by the fastest means available and the required information provided in the following order:

Line 1.	**Date-Time Group: DTG item impacted or was discovered.**
Line 2.	**Reporting Activity (unit identification code [UIC]) and location (grid coordinates of UXO).**
Line 3.	**Contact Method: Radio Frequency, call sign, point of contact (poc), and telephone number.**
Line 4.	**Type of Ordnance: Dropped, projected, placed, or thrown. If available, supply the subgroup. Give number of items, if more than one.**
Line 5.	**NBC Contamination. Be specific as possible.**
Line 6.	**Resources Threatened: Report any equipment, facilities, or other assets that are threatened.**
Line 7.	**Impact on Mission: Provide a short description of your current tactical situation and how the presence of the UXO affects your status.**
Line 8.	**Protective Measures: Describe any measures you have taken to protect personnel and equipment.**
Line 9.	**Recommended Priority: Recommend a priority for response by EOD technicians or engineers.**
Priority	**Basis**
Immediate	**Stops the unit's maneuver and mission capability or threatens critical assets vital to the mission**
Indirect	**Slows the unit's maneuver and mission capability or threatens critical assets important to the mission.**
Minor	**Reduces the units maneuver and mission capability or threatens noncritical assets of value.**
No Threat	**Has little or no affect on the unit's capabilities or assets.**

Figure 52. Sample UXO report.

3. The priority you request must correspond with the tactical situation you describe on Line 7 of the report (Impact on Mission). Remember, these priorities refer only to the UXO impact on your current mission. A priority of Minor or No Threat **does not mean** that the UXO is not dangerous.

4. Prioritizing the Spot Report

   a. The UXO spot report is forwarded through chain of command. Each commander in the chain who receives/reviews the report may change the priority to reflect the current tactical situation or projected battle plans. It is the responsibility of each commander in the chain to ensure that UXO spot reports are forwarded through command channels and that the proper priority is set for each report.

   b. If a higher-level commander in the chain changes a priority, all subordinate commanders, especially the commander of the reporting unit, must be told. Commanders must keep the following in mind: even though they may lower a priority, the reporting unit must be able to continue its mission until help comes. In addition to the priority status, all commanders need to be kept informed of the status of each UXO hazard in their area.

   c. The final priority is determined by the reporting unit's higher headquarters that is supported by EOD or engineer units. Based on mission, enemy, terrain, troops, time available, and civilians, EOD or engineer teams are dispatched to respond to the hazard.

5. Observe all safety precautions. Do not touch or move the UXO. The slightest movement can cause the UXO to detonate. If the UXO is suspected of having a toxic chemical filler, stay upwind. Observe and evaluate the UXO from the maximum distance possible using binoculars.

AMMUNITION COLOR CODE

The color codes and markings used in this appendix are for informational purposes only. They are provided to help you identify the different types of UXO. Keep in mind that each country that manufactures munitions has devised its own color codes. Remember, do not approach a UXO any closer than necessary to make an immediate identification. Remember also, that you are not responsible for determining UXO fillers.

The ammunition color codes in Tables 2 and 3 are used by the former Soviet Union. The markings used on Soviet chemical munitions are in Table 4.

NOSE BAND	BODY BAND	TYPE
Green	Blue	Fragmentation
Green	Blue and Green	Fragmentation and Chemical
Orange		Semiarmor Piercing
Blue		Armor Piercing
Red	Blue	Incendiary
	Red	Incendiary Dispenser
Red	Green	Persistent Chemical
Green	Green	Non persistent Chemical
White	White	Parachute Flare
Blue	Black	Rocket Assisted
Red	White	Practice

Table 2. Former Soviet Union color codes for bombs.

Color Codes (Bands)	Type
Red	Incendiary
Blue	Concrete Piercing
Black	Smoke
White	Illumination
Yellow	Ball Shrapnel
Khaki	Bar Shrapnel
One Green Band	Nonpersistent Agent
Two Green Bands	Persistent Agent

Table 3. Former Soviet Union color codes for projectiles.

Marking	Chemical Filler
P-4	White Phosphorous
P-5	Mustard Agent
PC	Lewisite Agent
P-10	Phosgene Agent
P-15	Adamsite (DM)
TP	Thermite

Table 4. Former Soviet Union markings for chemical munitions.